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Editorial Notes

Holding Companies

THE investigation into the affairs of holding companies by the Select Committee of the House of Lords has occupied seven days, of which three were devoted to gas holding companies. The Select Committee have now adjourned until Nov. 16, and will thereafter sit on Wednesdays and Thursdays. The decision to adjourn for six months appears to us difficult to comprehend. When the motion to appoint the Committee was passed, we were given to understand that the matter was one of urgency, and that no delay could be tolerated. It was suggested by the public utility interests of the country that they were heavily employed at the time with the vitally important duties of air raid protection, together with the even more essential work necessary to ensure the due functioning of their undertakings in time of war. Every request and every entreaty for postponement was, however, refused. It was therefore necessary to incur the heavy cost and labour of the enquiry at the expense of matters which many from a national point of view would have regarded as more urgent. Now, after a few preliminary days, the Committee is to adjourn for six months. What may happen during those six months none of us can predict.

Combustion Properties of Gases

WE publish to-day an abstract of the First Arthur Duckham Research Fellowship Report by Dr. A. E. Haffner—Communication No. 202 of The Institution of Gas Engineers. The research, which was carried out at the Karlsruhe Gas Institute, was concerned with the combustion properties of gases, and the report supplements the work of the Joint Research Committee of the Institution and Leeds University on the subject. The report adds substantially to our understanding of what happens when town gas is burned and in what way changes in gas characteristics—calorific value, composition, and specific gravity—affect the performance of appliances. The abstract in our pages to-day indicates the care and thoroughness expended on the research and the vast amount of experimental work involved.

The main properties of 20 synthetic mixtures which represent almost all types of gas which are likely to be distributed as British town gas have been determined. It has been shown that dilution of coal gas causes test burner numbers to fall, while benzole removal causes the test burner numbers to rise for the same calorific value of the mixture. Dehydration is considered to have an inappreciable effect. The greatest change in test burner value is caused by the admixture of carburetted water gas, which is related to the problem of peak loads and the coke market. "Nevertheless," states the report, "the widest difference that could be expected through this factor should remain within the toleration limits of most appliances, particularly if it is possible to adjust them on gas representative of the mean between the two conditions."

The investigation of the combustion properties of mixtures of coal gas and carburetted water gas is of particular interest, for by far the greatest change in combustion characteristics follows change in the proportion of carburetted water gas. The report considers the effect of the changes in composition which would follow from the figures set out by Mr. Glasgow in his Lecture on the tactical use of carburetted water gas as a coal gas auxiliary which he delivered before the Institution in 1935. Assuming that the coal gas includes blue water gas made in vertical retorts, it is shown that on the day of minimum output and lowest proportion of carburetted water gas the aeration test burner value would be 66, and on the day of maximum output and highest proportion of carburetted water gas the A.T.B. number would be 55—a fall of 11 units. If benzole is fully extracted at times of low demand, and the benzole plant is shut down at the maximum output period, the change in A.T.B. value can be from 69 to 55—a fall of 14 units. But this would appear to be within the toleration limits of all but very sensitive appliances, if adjusted initially at a mean value. As we have previously suggested, a scheme for compensating for the adverse effects upon test burner values of changes in the proportion of carburetted water gas in town gas consists of

modifying the composition of peak load water gas. The specific gravity can be decreased by admixture of hydrogen or by partial replacement of carbon monoxide by hydrogen. Hydrogen, of course, has a high rate of flame propagation in mixture with air. Despite this, as was shown by the work carried out at Leeds and reported at the last Autumn Research Meeting of the Institution, the effect of its addition on the aeration test burner number is comparatively small.

The results obtained from the research reported by Dr. Haffner have been used to test the American Gas Association's "C Factor," which appears to have "no appreciable advantage over test burner values," and also Minchin's "Function D." The final section of the report is concerned with observations upon several of the gas mixtures when burned in typical appliances, experiments having been made with a portable fire, on unaerated flames, and with a boiling burner. It is clear, states the report, that bunsen flames are much more sensitive to change in gas value than are unaerated flames. The unaerated flame has, therefore, advantages in circumstances where a variation in combustion quality of the gas can be expected.

Interpretation of Laboratory Results

A GREAT deal of work has been carried out during the past ten years in correlating laboratory experiment with large-scale works practice, and quite a remarkable degree of progress has been achieved. The work has been undertaken in a skilled and thorough manner by several of the larger gas undertakings, in the research laboratories of the manufacturers of gas making plant, at the universities, and notably at the Fuel Research Station. Extensive practical experience is, of course, required in the interpretation of results gained in the laboratory. But, while large-scale testing is obviously desirable, and is the final criterion, it is expensive, and the development of reliable small-scale technique is of very great value to the Gas Industry.

In the laboratory one may get results quite different from those obtained in large-scale working—one usually does, in fact. We think that in the past this dissimilarity led many gas engineers to the opinion that laboratory investigation on the behaviour of coals on carbonization were all very well, but were not of great benefit when it came to operating on a works scale. There is, however, no reason why small-scale tests should give the same results as those obtained in works practice. What is wanted is an indication of what is to be expected of a coal, or a blend of coals, when subjected to carbonization on a large scale: and apparatus has been developed and methods standardized which will give this very valuable information.

There are several types of laboratory apparatus and method, and, without doubt, among the most important and serviceable is the Gray-King assay developed and standardized at the Fuel Research Station. The Gray-King assay has yielded consistent results, a whole mine of valuable information, and it is proving more and more useful with the greater influx to the Gas Industry of fully trained and qualified chemists capable of interpreting laboratory results in terms of large-scale working. Only recently Mr. Gardiner, of Tottenham, explained how valuable the Gray-King assay has proved to his Undertaking. He referred to the hundreds of assays which have been conducted at Tottenham; and his experience has shown that the assay affords a reliable method of gauging the usefulness of a coal for gas making purposes,

Blending of Coals

THE subject of blending of coals, from the points of view of modifying the properties of coke and of making available to the Gas Industry a wider range of coals, is one of great importance, and in this connexion we would call attention to a valuable Paper given by Dr. J. G. King to the Institute of Fuel this month on the blending of high-volatile bituminous coals. Previously in the programme of the work at the Fuel Research Station the Gray-King assay has been correlated with horizontal retort and vertical retort practice, and the results have been published. The correlation has usefully been extended to include intermittent vertical chambers, and a study has been made at the Fuel Research Station of the blending of high-volatile bituminous coals of dissimilar caking power. Four caking coals and two non-caking coals have been examined, and the results of the investigation were set out by Dr. King in his Paper.

The findings of the investigation are most interesting. It has been amply demonstrated that both forms of the Gray-King assay are of value in connexion with blending, the low-temperature form in defining the proportions of the constituent coals and the high-temperature form in providing correlation factors for yields and information regarding the effect of one coal upon another. It has been found that, in the carbonization of blends of crushed coal in intermittent vertical chambers, as the proportion of non-caking coal increases a point is reached when the strength of the coke suddenly decreases. From the low-temperature assay it is possible to identify the proportions of coal in the blend which utilizes the greatest amount of the non-caking coal without affecting the strength of the coke.

Fuel Research Results

IN the high-temperature assay the progressive action of non-caking coal to caking coal in a blend results in a steady reduction of coke and liquor yield, a slight reduction of tar yield followed after a certain stage by a steady increase, and irregular changes in gas volume, calorific value, and thermal yield during the early stages, followed by steady decreases in all cases. In the plant similar progressive changes were shown, with the exception that the thermal yield is increased by the formation of water gas from part of the water of distillation of the non-caking coal. The time of carbonization of British caking coals, stated Dr. King, may vary as much as 15%, but in every case the addition of high-volatile non-caking coal markedly decreases the rate of carbonization, partly owing to the increased amount of water to be evaporated, partly to the water gas reaction, and partly to undefined causes. Dr. King was, of course, referring to crushed coals. Sized non-caking coal retains its shape during carbonization and maintains a porous charge. Such coal can be carbonized more rapidly even than caking coals, the greater porosity more than overcoming the drain of heat necessitated by the evaporation of additional moisture. In practice the disadvantages of blending—reduced output of gas and lower coke yield—would have to be offset against the advantage of utilizing for gas manufacture 30% to 60% of non-caking coal.

The Gas Industry has benefited and will continue to benefit from this work of correlating laboratory tests to large-scale operation being carried out at the Fuel Research Station. The results given in the Paper in question will, we feel sure, be studied closely. There are, however, two points in connexion with the investigation which we would mention. The

first is that the Gas Industry, while needing to manufacture a coke of reasonable strength which will withstand handling and transport without undue breakage, it is not concerned with maximum strength. What it for the most part desires information on is the manufacture of cokes of properties which render them suitable for use in the domestic open firegrate—reactive cokes which are readily combustible. And it would have been very useful had Dr. King dealt in his Paper with the effects of blending in this direction. The other point is that steaming was avoided as an unnecessary complication. It should be allowed for, however, in making comparisons with gas-works practice.

The "Square Deal"

THE Transport Advisory Council have now reported to the Minister of Transport upon the memorandum which was submitted to the Minister by the Railway Companies. Before the submission of the memorandum to the Minister the Railway Companies had obtained the concurrence of practically all the interests affected except the coal mining industry, and the report of the Transport Advisory Council is substantially in favour of the suggestions contained in the memorandum. The report is conveniently summarized in a pamphlet which has been issued by the Railway Companies' Association.

It is only possible to mention the more important of the proposals contained in the report. It is to be noticed that the Transport Advisory Council support the suggestion that the provisions of the Railways Act, 1921, with regard to the standard revenue should be repealed. It will be remembered that the Railways Act, 1921, fixed a standard revenue which was, with some adjustment, the revenue obtained by the Railway Companies in the year immediately preceding the War. The whole system of rate structure was designed so as to ensure that the Railway Companies should obtain their standard revenue. Although the provisions of the Act with regard to the standard revenue were designed in the interests of the trader no less than of the Railway Companies, the fact that in no year since the War have the Railway Companies obtained their standard revenue has undoubtedly nullified any case which the traders could make out for a decrease in railway rates. The Railways merely had to show that the standard revenue was not reached, and it thereupon became the duty of the Railway Rates Tribunal to increase the standard charges. It also placed the Railway Companies in the invidious position of having a legally guaranteed revenue, although their receipts have in actual fact never been sufficient to obtain that revenue. Few will regret the recommendation that this obsolete legislation should be swept away.

The report also supports the suggestion that the standard charges and classifications should be repealed, although no doubt some voluntary system of classification will be maintained by the Railway Companies. Further, the restrictions under which the Railway Companies laboured with regard to exceptional rates will, if the report is adopted, be abolished. These restrictions made it necessary to obtain the approval of the Railway Rates Tribunal in respect of all exceptional rates which were below a certain level of the standard charges. Further, the provisions of the law with regard to undue preference are also to be abolished. These provisions are no doubt a survival of the years in which the Railway Companies had a virtual monopoly of transport, and there is substantial agreement among traders that the effect of the undue preference provisions to-day is to place an unfair shackle upon the freedom of the Railway Companies.

On one point the Traffic Advisory Committee failed to reach agreement. This point was the suggestion of the Railway Companies that they should be relieved of the obligation to publish the rates which were applicable to all forms of transport. A certain apprehension has been felt by owners of private sidings as to the effect of the new legislation upon agreements relating to those sidings, but it is to be noted that the Railway Companies have not proposed any legislation which would affect their private siding agreements with traders.

Protection of Traders

IT is too early yet to criticize the report, but it is obvious that the attention of the Gas Industry will be directed primarily to those provisions which relate to the protection of traders. This will be particularly important to those interested in the conveyance of coal, having regard to the fact that the Mining Association were not able to come to an agreement with the Railway Companies, and that no less than 95% of the inland coal trade is tied to the railways. With regard to this, the report contains the following proposals:

(1) That there should be periodical meetings or conferences between the Railways and trade and industry, although such meetings shall not be obligatory by statute.

(2) That where agreement is impossible, the Railways shall give a formal notice of an increase of charges, and this matter should be referred to the Railway Rates Tribunal. This Tribunal, after hearing all parties, shall fix such rates as may appear reasonable.

(3) That any trader or body of traders shall have the right to approach the Tribunal, either on the ground that the charges are too high, or that the charges made to other traders with whom the applicant is in competition are low in relation to those paid by him.

The basis upon which the Tribunal shall determine whether a charge is reasonable is also laid down, in that the Tribunal are directed to consider the following among other factors: (*a*) The public interest; (*b*) the cost of affording the service; (*c*) the existence of competitive transport facilities; (*d*) the effect of the charge on the financial position of the parties concerned; and (*e*) the charge made to other traders for carriage of like merchandise.

With the claim of the Railway Companies to a "square deal" the Gas Industry has always had some measure of sympathy. It has regarded the Railway Companies as a public utility interest restricted like the Gas Industry by many obsolete survivals of the last century. At the same time, the Gas Industry could not agree to proposals which might be in any way open to abuse. Such an abuse would arise if traffic now carried by road was to be attracted to the railway by cheap rates made possible by placing an undue burden on heavy goods such as coal. A rise in railway rates applicable to coal would be particularly serious, in that it would increase still further the heavy financial obligations which have been imposed upon the Industry by the monopolistic selling schemes constituted under the Coal Mines Act. It will now remain for the Government to decide whether it will take legislation to implement the report and there will no doubt be ample opportunity for further consideration and negotiation.

W.G.C. Development

STEADY progress is once again the keynote of the Report of the Women's Gas Council, presented at the Fourth Annual General Meeting held at Gas Industry House on May 11. Lady Milne-Watson, who is a Vice-President, presided over the meeting, and in thanking her for her able conduct of the business, Miss Wolseley-Lewis, the Executive Chairman, paid well-merited tribute to Sir David and to the Gas Industry generally, to whom the Council owed many of the amenities which they now enjoy.

To gain any complete picture of the wide ramifications of the W.G.C., it would be necessary to read carefully through their nineteen-page Report. Suffice it to mention here the salient features, some of which are referred to in greater detail in our report of the meeting on later pages of this issue. Nearly twenty fresh branches have been formed during the year and over 4,000 new members enrolled—bringing the total membership up to 13,000. It is interesting to note that there are now over 600 members in Scotland, and it is hoped to form branches in Glasgow and possibly Edinburgh in the near future. The Council continue their liaison with and representation on a large number of National organizations, while their work in connexion with the training of demonstrators does much to ensure a high standard of qualifications among those who play so important a part on the sales and service side of our Industry.

The Report also speaks of the W.G.C. Exhibit at the British Empire Exhibition at Glasgow, while they were also represented at the Women's Fair at Olympia, where a number of interesting meetings were arranged. Both these efforts have been of great advantage to the Industry from a propaganda aspect, and the Indusry should be indebted to the W.G.C. for their work in this direction. As some indication of the growing recognition of the Council's service, it is noteworthy that throughout the year there has been a constant demand by branches and other local organizations for lectures from Headquarters. The number of lectures given last year was more than double the total for the previous twelve months.

The Report concludes with a word about the W.G.C. organ, *Fanfare,* the popularity of which in its new form increases steadily. The standard of production of this magazine has greatly improved during the year, and it is reaching a widening circle of readers. By way of summary, it may be said that the fourth year of the Women's Gas Council has been one of continued development. There can be no doubt that women have found companionship and help in belonging to an organized group, and members have, through connexion with this nationally constituted body, found ways of giving service both as individuals and in their corporate capacity. Once again we would express the hope that undertakings in whose areas a branch of the W.G.C. has not yet been formed will take early opportunity of reviewing the position, bearing in mind the considerable value such an organization can be in furthering a true appreciation of gas service.

A.R.P. Measures in Birmingham

Those who have had the opportunity of studying Mr. G. C. Pearson's recent Presidential Address to the Midland Association of Gas Engineers and Managers will have recognized in the Birmingham Gas Department a pioneer of gas-works A.R.P. measures. At the Spring Meeting of the Midland Association last Thursday members were enabled to witness at first hand many of the methods described by their President in his Address—and a most interesting and instructive day it proved to be. It is hardly necessary to say here that in time of hostilities gas would be an even more vital necessity than it is in peace time, and in such circumstances it is essential for undertakings to continue to carry out the special duties which they owe to the public. It is emphasized that during any future hostilities the vast majority of industrial concerns, including gas undertakings themselves, will be to a greater or less extent engaged in the production of munitions or essential parts thereof. And needless to add, the major proportion of these industrial firms use gas or gas coke in one or other of their processes. The steps which the Birmingham Gas Department have taken to safeguard their production and supply were therefore studied with the greatest interest by the members of the Midland Association last week.

Among these may be mentioned the provision of underground shelters, with special ventilating systems, small steel shelters at various points about the works for key men, a simple but effective method of protecting against splinter and blast the windows of buildings housing vital plant, in addition to fire-fighting services and a fully-equipped decontamination centre, where the protective clothing issued to the emergency men was donned for the benefit of the members and the proper method of undressing a contaminated person demonstrated in detail.

Perhaps chief interest attached, however, to the demonstration which was given in the afternoon of extinguishing a burning main by means of the special bagging device which was described by Mr. R. G. Marsh, the inventor, in the "JOURNAL" last November. The demonstration, which is described in greater detail on later pages of this issue, was carried out on a 30-in. main specially laid for the purpose in the Department's Pipe Store Yard. The flames, which rose to a height of 30 ft. into the air, were quickly subdued to proportions sufficiently small to allow of a gang of men approaching the open end of the main and stopping it off with clay or inserting a plunger to bring about the final extinguishing of the fire. The Birmingham Gas Department are certainly to be commended upon the advanced state to which they have brought their A.R.P. measures and, as always, upon their readiness to give other members of the Industry the benefit of their experience in this important matter.

Mr. George Helps will Demonstrate

There appears on another page of this issue an interesting announcement by Mr. George Helps of a private demonstration which he proposes staging in London within the next few weeks. Exact date and time are not yet fixed, but Mr. Helps would welcome applications from those who would like to see the appliances which he intends to demonstrate.

Full of fight as ever, Mr. Helps comes boldy into the open claiming for his new appliances advances which are more than usually intriguing, and we do not imagine that he will have any difficulty in collecting good audiences to see what will undoubtedly be an interesting show. He emphasizes, however, that it will be private and by invitation only.

Three into Two—Won't Go

In connexion with Court cases, one is sometimes inclined to wonder why particular points should have been raised at all, and at other times to feel surprise that they should not have been brought up for settlement at a very much earlier date. A question of the latter kind—of importance alike to Companies and to that large and ever-growing section of the business community coming under the designation of Company Directors—was recently before the Court of Chancery, when the Judge himself remarked that it raised a very curious point on which it might have been expected that some authority could be found, but it appeared that there was none. One of the Company's Articles, which it was stated was in common form, and had been in use for many years, stipulated that "one-third of the Directors (other than the Governing Directors and the Managing Director or Directors), or, if their number is not a multiple of three, then the number nearest to, but not exceeding, one-third, shall retire from office." There being at the present time only two ordinary Directors, the plaintiff sought direction as to whether, in fact, he had retired from office by rotation under this Article; it being contended on his behalf that, "there was no number of Directors which did not exceed one-third, as one was more than one-third

of two." On the other hand, it was argued for the Company that, the retirement of a Director or Directors being the purpose of the relevant Article, in the existing circumstances the words "not exceeding one-third" should be excluded. The Judge, however, held that, with only two ordinary Directors, there being neither one-third nor any number which "was nearest to, or did not exceed, one-third," the conditions of the Article were not satisfied, and the Director did not retire by rotation.

Personal

Mr. T. E. RICHMOND, Commercial Superintendent to the Blackburn Corporation Gas Department, has been appointed Trustee and Chairman of the Committee of the Blackburn Branch of the National Association of Local Government Officers.

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Consequent upon the retirement of Mr. J. H. Canning, O.B.E., J.P., recently announced in these columns, from the position of Engineer and Manager of the Newport (Mon.) Gas Company, the following staff changes are announced. The Directors of the Company have promoted Mr. REGINALD STONE SNELLING, F.C.I.S., the Secretary of the Company, to the position of General Manager and Secretary. Mr. Snelling has been in the service of the Company since 1906, was appointed Assistant Secretary in the year 1931, and Secretary in May, 1938. Mr. JOSEPH FREDERICK RUST, M.Inst.Gas E., has been promoted to the post of Engineer of the Company. Mr. Rust has been in the service of the Company since 1905, being appointed Manager of the Crindau Works in 1919 and Assistant Engineer and Manager of the Company in 1920, continuing to serve in that capacity up to the time of Mr. Canning's retirement.

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At a recent meeting of the Directors of the Cheltenham and District Gas Company, Mr. A. L. MORRIS, F.I.A.C., Commercial Manager of the Company for several years past, was appointed to the position of General Manager of the Undertaking. Mr. Morris is also Commercial Manager to the Gloucester Gas Light Company, Managing Director of the Campden Gas Company, Ltd., and the Bideford-on-Avon Gas Company, Ltd.; also Comptroller of Purchases to the Severn Valley Gas Corporation, Ltd., and Gas Consolidation, Ltd.

The re-organization which was occasioned by the death of Mr. L. E. Twycross (Engineer and Works Manager) in July last, also includes the promotion of Mr. A. G. HOLTAM to Distribution Manager, and Mr. L. R. COWLEY to Works Manager.

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Mr. T. C. BATTERSBY has been appointed General Manager and Chief Engineer of the Watford and St. Albans Gas Company. Mr. E. T. WARREN has been appointed Secretary.

Mr. Battersby has been associated with the Gas Industry for the greater part of his life. He was articled as an engineering pupil with the Kendal Corporation Gas and Water Department. Later he obtained the position of junior engineer to the Bournemouth Gas and Water Company. In 1922, he joined the former St. Albans Gas Company as Assistant Engineer and Chemist, and on the amalgamation of that Undertaking with the Watford Company, was appointed St. Albans Works Manager and Engineer. In 1937, Mr. Battersby became Chief Engineer of the Company, being responsible for the rationalization of the Company's manufacturing stations and the consequent plant and main installations.

Mr. Warren, the new Secretary, has been in the service of the Company for over seventeen years and has acted as Assistant Secretary under the late Mr. Wilks. He is a fellow of the Chartered Institute of Secretaries.

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Mr. I. F. GRIX, of the Dowlais Gas Company, Glamorgan, has been appointed Secretary-Accountant of the St. Austell Gas Company, Ltd. He is expected to take up his duties on July 1.

Obituary

The death has occurred at the age of sixty-three of Mr. CHARLES EDWARD CROMPTON, who since 1923 has been Chairman of Cochran & Co., Ltd., Newbie Engineering Works, Annan.

A son of Mr. Edward Crompton, inventor of the well-known Cochran steam boiler, Mr. Crompton had engineering experience both in the workshops and drawing office of the Vulcan Foundry and Engineering Company, and later in the firm of Messrs. Cochran & Co., Birkenhead. In 1898 Messrs. Cochran & Co. transferred their business from Birkenhead to Annan, and Mr. Crompton became Secretary of the firm. When the Company was reconstructed in 1904 Mr. Crompton was appointed a Director and in 1923 he became Chairman.

Letter to the Editor

Outline of History of Lighting by Gas

SIR,—This book by Mr. Dean Chandler I have found full of interest on matters I once knew something about, but had forgotten—in addition to many more I did not know. I try to keep in touch with all writings of consequence on the fundamentals of gas combustion and application. How this book has escaped me I do not know, and I still should not have possessed it had it not been for my call on you last week.

I write because I think it will not be out of place to acknowledge my indebtedness to Mr. Chandler for having compiled it in so wonderful a manner. I express the hope that I am about the only student who has left this book off his shelf for so long.

Yours, &c.,
GEORGE HELPS.

Nuneaton,
May 22, 1939.

Forthcoming Engagements

May.

25.—Midland Juniors.—Visit to Stratford-on-Avon.
25.—Wales and Monmouthshire Association.—Annual Meeting at Newport.
25-26.—Eastern Counties Association.—Spring Meeting at Grimsby.

June.

1.—L.C.C.A.—Finance Committee, 10.45. a.m.; Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m.
6.—I.G.E.—Council, Institution of Civil Engineers, 9.30 a.m.
6, 7, 8, and 9.—I.G.E.—Seventy-Sixth Annual General Meeting, Institution of Civil Engineers.
10.—Manchester and District Juniors.—Visit to Chester.
12.—L.C.C.A.—Technical Committee, 2.30 p.m.
14.—Coke Salesmen's Circle.—Visit to Works and Laboratories of Eagle Range and Grate Company, Ltd., Aston, Birmingham.
21.—I.G.E.—Domestic Heating Committee, 2.30 p.m.
22.—S.B.G.I.—Council Meeting, 11.15 a.m.
23.—North of England G.M.A. (Auxiliary Section).—Half-Yearly Meeting at Newcastle-upon-Tyne and Chairman's Address by Mr. G. J. Duncan.
23.—Waverley Association.—Annual Meeting at Edinburgh.

The S.B.G.I. Golfing Circle

The Society of British Gas Industries Golfing Circle is holding its Spring Meeting at Royal Mid-Surrey Golf Club, Richmond, Surrey, on Monday, June 5, and cordially invites golfing members of The Institution of Gas Engineers attending the 76th Annual General Meeting in London to take part in the competition for the "Coronation Plate."

The Bensham Seam

As part of the Physical and Chemical Survey of the National coal resources, the Bensham seam of Northumberland has now been examined over an area extending from Ashington in the north to the Tyne in the south. The results are given in a report issued by the Department of Scientific and Industrial Research (Fuel Research Survey Paper No. 47, published by H.M. Stationery Office, 2s. 6d. net), which report gives full data on twenty-five samples of the seam taken from eighteen localities.

The Bensham is an important seam in Northumberland, but is somewhat variable in structure, usually occurring in two parts. In the north, two seams occur at the Bensham horizon, and the nomenclature is confusing and inconsistent. In view of this, the report includes an appendix, contributed by the Geological Survey, giving details of correlation.

In the south a variable dirt band, seldom exceeding 2 ft. thick, divides the Bensham seam into two parts. There was found to be considerable variation in quality in the two parts, the bottom being good in the north and depreciating southwards, while the top was good in the south, depreciating northwards. The data showing these variations are summarized in the report. It is interesting to note that, in the southern district, the agglutinating value shows a considerable increase from north to south, the seam changing from a low carbon, weakly-caking house and manufacturing coal to a medium carbon, strongly-caking gas coal closely resembling the coking-gas coal of north-east Durham.

An appendix deals with washing tests carried out on a 12½-ton sample of coal from the seam.

News of the Week

The Tender of Messrs. R. & J. Dempster, Ltd., Manchester, for the erection of a three-lift gasholder has been accepted by the Penrith Urban Council.

The Coke Salesmen's Circle are to visit the Works and Laboratories of the Eagle Range and Grate Company, Ltd., at Aston, Birmingham, on Wednesday, June 14.

At Their Meeting on May 16 Hinckley U.D.C. decided to install gas fires in the Council Chamber, following their consideration of a report by the Gas Manager on smoke abatement.

A Two-Lift Spiral Holder is to be erected at the Gas-Works of the Skelmersdale U.D. Council, who have accepted a tender of £3,600 for the dismantling of the present gasholder and the erecting of the new.

New Coke Oven Plant at the Clyde ironworks of Messrs. Colvilles, Ltd., costing almost £500,000 is to be ready for production in June. The by-product gas will be piped over the River Clyde to the Clydebridge steelworks, where it will be used as fuel.

An Exhibition with cookery demonstrations was opened at Heckington on May 15. It has been organized by the Heckington Gas Company. Sir Harold Middlebrook, Chairman, Mr. F. D. Richmond, Managing Director, and Mr. G. R. Sharman, Manager, were among those present.

The Power-Gas Corporation, Ltd., have received an order for a carburetted water gas plant for the Fulham Works of the Gas Light and Coke Company. The installation will comprise two units automatically and mechanically operated, of a total capacity of 6 million cu.ft. per 24 hours of 500 B.Th.U. gas.

Domestic Science Classes at the Girls' Industrial Union, Barbados, are aided by gas cooking equipment supplied by the Barbados Gas Company. We learn from an excellent "write-up" in the *Barbados Advocate* for May 6 that there is a noticeable absence of aprons among the pupils, a tribute to the cleanliness of gas as a fuel.

At the Royal Easter Show, Sydney, the Australian Gas Light Company's display was a comprehensive array of domestic appliances, industrial gas equipment for commercial kitchens, and space heating purposes. A feature was the all-gas unit kitchen. This type of kitchen has received particular attention upon the part of the Australian Gas Light Company in recent times, and the Company is prepared to assist householders to lay out their kitchens to the best advantage with regard to economy and convenience.

From July 1 all factory owners in Great Britain will have to provide a statutory minimum illumination in their premises. In a booklet recently issued by the B.C.G.A. (entitled "Light on Industry") the case for factory lighting by gas is put clearly and convincingly, and undertakings will find this publication useful for distribution among factory owners in their areas as a means of paving the way for a bigger industrial lighting load.

The Joint Committee on Materials and Their Testing announce the publication of the reprints of the second General Discussion on Non-destructive Testing held under their auspices in London on Nov. 20, 1938. All the Papers then presented, with the report of the discussions and communications, are now available as reprints from the Journal of the Institution of Electrical Engineers. Copies (about 81 pp.) are available in paper covers at the price of 3s. 6d., post free, from the Secretary, the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C. 2.

The Fourth Exhibition organized by the Gas Department was opened at the Ilkeston Town Hall by the Mayor, Councillor H. Trueman, on May 15, and continued for the rest of the week. The Mayor mentioned that while the majority of gas undertakings in the country had raised the price of gas owing to increasing costs, the Ilkeston Gas Committee had maintained the price at its present level. This had only been possible through the continued support of the public. In proof of this the Mayor said the output of gas had increased in the last ten years from 107,796,000 cu.ft. to 163,425,000 cu.ft.

The Fifth Volume of the Physical Society's *Reports on Progress in Physics* deals with advances in physical science up to the end of 1937. Each report is contributed by a specialist in his particular subject. The growth of physical science is now so rapid that it is almost impossible to keep pace with its many advances; the aim of these reports is to assist the non-specialist in his endeavour to keep himself informed of the developments constantly being made. The ready sales of the first four volumes encourage the Society in its belief that these reports fulfil a long-felt need, and it is therefore with confidence that the fifth report is now offered to the public. The volume is bound in cloth. There are 445 pages of text and illustrations. The price is 20s., post free, from any bookseller or the publishers, the Physical Society, 1, Lowther Gardens, Exhibition Road, London, S.W. 7.

Coke Oven Managers Visit N.E. Trading Estates

The North-East Coast branch of the Coke Oven Managers' Association visited on May 11 the new factory of "Huwood" Mining Machinery, Ltd., a subsidiary of Hugh Wood & Co., Ltd. The factory was completed last year on the Team Valley Trading Estate, Gateshead-on-Tyne.

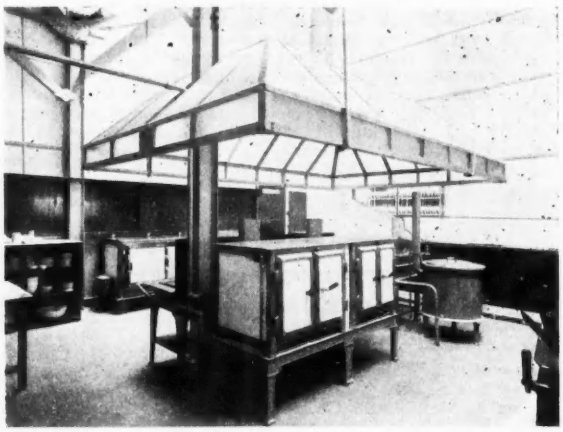
The visitors were received by Mr. Hugh Wood, Managing Director, and Mr. Wilson Britton, and a tour of the works was undertaken, great interest being shown in the various products on view.

The Association had with them Mr. J. Currie, President, and Mr. Middleton, President of the N.E. Coast Branch. Among those present was Mr. Nielson, of Turners Asbestos Company, Ltd., who explained some of the applications of "Everite" asbestos pipes in the Gas Industry.

New Gas Lighting in St. Helens

The lamps adopted for the improved street lighting scheme at St. Helens, for which the Ministry of Health have sanctioned a loan, consist of Avil "Arcturus," having four-light No. 2 cluster burners and "Registered Back" reflectors in "Staybrite" steel, manufactured by Messrs. Foster & Pullen, Ltd., Avil Works, Bradford. These are a smaller size of the lamp illuminating Clifton Terrace, Folkestone, illustrated in the B.C.G.A. publication "Light on the Roads." We published illustrations and some details of the St. Helens installation in our issue of May 10, p. 390.

Gas Kitchen for Social Centre



In the kitchen of the Slough Social Centre (Slough Trading Estates, Ltd.), which has recently been completed, the cooking is by gas; and we reproduce above a view of the kitchen showing some of the large-scale Radiation appliances which have been installed. All the apparatus is in grey mottled enamel finish.

Memorial to Mr. Ernest W. Smith

A bronze plaque to the memory of Mr. Ernest W. Smith, Chairman of Smith Meters, Ltd., and a Director of United Gas Industries, Ltd., who died on Aug. 18 last year, was unveiled at the Company's Kennington Works on May 17 by Mr. Lewis Smith, who, with his brother, the late Chairman, inherited the meter business established in 1834. Over 250 of the employees who had subscribed to the memorial, together with representatives of the Streatham Works, attended the ceremony.

Mr. J. Busher, Shop Chairman, in asking Mr. Smith to unveil the plaque, said the employees were grateful to the Works Committee for the inception of the memorial. Thanks were due to the members of the brass finishing section for the constructural work, to business concerns who had given their work gratis as a tribute to the late chief, and to Mr. R. Gaskin and Mr. Norman Smith for their co-operation in the erection of the memorial. The plaque was fixed almost in the position in which Mr. Ernest began what proved to be a brilliant career as a gas meter manufacturer. He could add little to the hope he had expressed at a works meeting last August for the maintenance of the example Mr. Ernest had set and which had been fundamental to the firm's success.

Mr. Lewis Smith said no words of his could convey his feelings to the employees for that emblem of respect and the desire that had prompted them to produce that memorial. His brother had, indeed, worked hard to give work and happiness to those who helped him in the trials of the business that he brought to the highest position in the Industry. His generosity was unbounded, and they all deplored the tragedy of his passing so early in life.

Mr. Douglas Smith, son of the late Chairman, laid a laurel wreath below the plaque, and Mr. Norman Smith, another Director and son of Mr. Lewis Smith, placed a spray of red roses. The employees then filed passed the memorial.

A New Book on Fertilizers*

Twelve years have elapsed since Mr. Parrish and Mr. Ogilvie brought out their original book, "Artificial Fertilizers: Their Chemistry, Manufacture, and Application." In the interim a great deal of scientific progress and technical development has taken place. In a new volume just published the Authors have brought the subject-matter into consonance with current practice. The revision has been thorough and no fewer than six new chapters have been introduced. There is no doubt at all that the book will be of great service to many manufacturers.

In a general survey of the fertilizer position the Authors express the opinion that the calcium superphosphate industry in this country should have linked itself with the Gas Industry long ago, as the latter was in a position to provide sulphur, in the form of spent oxide, and by-product ammonia at attractive prices, and mutual advantage, they maintain, would have resulted from a consolidation of interests. A great advance has been made in the production of concentrated gas liquor. Liquor can be produced to-day by the Parrish processes at about 5d. to 6d. per unit of ammonia, or even cheaper, if steam from waste heat boilers is available.

In their new volume, "Calcium Superphosphate and Compound Fertilizers," Messrs. Parrish and Ogilvie treat the structure of the British superphosphate industry, and they suggest what they regard as a sounder economic basis. Costs of manufacture of sulphuric acid and calcium superphosphate are set out, and important factors governing such costs are elaborated, and the design and management of a fertilizer works are dealt with in some detail.

The book, which runs to well over 300 pages, is divided into eighteen chapters. It is very well printed and illustrated (altogether there are 149 photographs and diagrams), and is most readable.

* "Calcium Superphosphate and Compound Fertilizers: Their Chemistry and Manufacture." by P. Parrish, F.I.C., M.I.Chem.E., M.Inst.Gas E., F.I.I.A., and A. Ogilvie, M.I.Mech.E. Published by Hutchinson's Scientific and Industrial Publications, price 35s.

Canadian Gas Association

Programme for Annual Convention

Contributions obtained by our Papers Committee of the Canadian Gas Association for presentation at the 32nd Annual Convention of the Association to be held in Hamilton, Ontario, June 6 and 7, are as follows:

"Rental Plan for Water Heaters," by Geo. L. Schofield, New Business Manager, Republic Light, Heat, and Power Company, Buffalo, N.Y.

"Air Conditioning and House Heating," by James R. Scott, Surface Combustion Company, Toledo, Ohio.

"The Natural Gas Industry in Alberta," by Julian Garrett, Manager, Northwestern Utilities, Ltd., Edmonton, Alta.

"The Electric Bogey," by Frank D. Howell, Division Superintendent, Dominion Natural Gas Company, Ltd., Brantford, Ontario.

"Distribution Details," by P. W. Geldard, Assistant Engineer of Distribution, Consumers' Gas Company of Toronto.

"Gas in Industry," by James A. Ward, Industrial Engineer, Republic Light, Heat, and Power Company, Buffalo, N.Y.

"Medium Pressure *versus* Low-Pressure Distribution for a City with Relatively High Customer Demands," by Barclay W. Pitfield, Assistant Engineer, Northwestern Utilities, Ltd., Edmonton, Alta.

"Personal and Public Relations," by Geo. R. Huxtable, Comptroller, Ottawa Gas Company, Ottawa, Ontario.

"Corrosion on Underground Piping," by Erick Larson, Engineer, Messrs. Stevenson, Greist, & Larson, New York, N.Y.

There will also be a number of open discussions on problems of national interest to the Gas Industry, and some other phases of the business will be brought up. Zenn Kaufman's outstanding address on "Showmanship in the Gas Business" will also be something to attract and hold the attention of our many delegates. It is expected that the "CP" gas range will also be a talking feature at this Convention.

The attention of all prospective delegates is directed to the fact that Their Majesties the King and Queen are expected to visit Hamilton on the afternoon of the second day of the Convention. Efforts are being made to allow delegates to obtain a good view of Their Majesties during the Royal tour of the City, and, if suitable vantage ground can be obtained, announcement of the fact will be made later.

British Standards Institution

Annual General Meeting

The Annual General Meeting of the British Standards Institution will be held at the Dorchester Hotel, Park Lane, W. 1, on Thursday, June 15, 1939, at 11.15 a.m., with Sir Frank Heath, G.B.E., K.C.B., in the Chair. The business of the Meeting will be to elect the General Council, to receive the Accounts, to appoint Auditors and fix their remuneration, and to receive a brief Statement from Chairmen of various Divisional Councils and Industry Committees on the progress of the Institution's work. Constructive suggestions will as usual be most welcome. It would, however, be helpful if notice of any such suggestions were sent in, in writing, prior to the meeting. They will, without delay, be considered by the Advisory Committee of the General Council.

Meters, Ltd

Report of the Directors

The Directors of Meters, Ltd., of Manchester, state in their report for the year ended March 31, 1939, that the net profit amounts to £25,160, which, added to the balance of £13,696, gives a total of £38,855. After deducting the interim dividends amounting to £6,241 paid in November last, the amount now available for appropriation is £32,615. The Directors recommend (*a*) the creation of a reserve for National Defence Contribution of £2,200, (*b*) the creation of a reserve for air raid precaution expenses of £5,000, (*c*) the payment of final dividends for the year ended March 31, 1939, of 2¾% (actual) upon the Preference Stock and of 6½% (actual) upon the Ordinary Stock, making the total dividends for the year 5½% upon the Preference Stock and 9% upon the Ordinary Stock (both *less* income-tax), and (*d*) that the balance of £13,377 be carried forward to next year's accounts.

Gas Cookery for the Blind

Radiation is proud to announce that Braille characters for the use of blind people are being introduced into a portion of the recipes of the Radiation Cookery Book. A cooking chart for "Regulo" settings has already been printed.

New Showrooms for South Suburban Company at Orpington

Attractive new showrooms and offices for the South Suburban Gas Company in the rapidly developing district of Orpington were opened on May 17 by Mr. F. W. Moore, J.P., Chairman of the local Urban District Council.

IT was not very many years ago when Orpington was little more than a country village. To-day it is an up-to-date and steadily growing township of more than 52,000 inhabitants, with a High Street which is being widened and modernized and whose large blocks of shops give an appearance of activity and prosperity.

About nine years ago the South Suburban Gas Company opened their first showroom—in an adapted private house which until recently occupied the present site. The Directors realized, however, that these premises were no longer in keeping with the growing importance of the district; nor could they continue to cope adequately with the increasing volume of business which this development brought in its train.

They therefore decided to erect an entirely new building on the original site—a building which, distinct from its neighbouring rows of shops, immediately catches the eye by its fresh and dignified appearance, while at the same time conforming generally to its surroundings. The care with which every detail of the interesting elevation has been worked out is apparent in the arrangement of the various materials, presenting a harmonious whole.

The frontage has been set back beneath a canopy of reinforced concrete, the flanking piers being faced with cream faience tiles, arranged by means of wide and thin joints to give scale to the buildings. The small amount of paintwork to the door of the showroom is red in colour, matching the lettering on the canopy and at the top of the building.

The large upper windows have cream faience architraves and are set in facing bricks of a general light brown colour. The curved angle windows to the first floor are a feature of the elevation, lending dignity externally and internally to the Demonstration Room. An interesting feature incorporated in the street elevation is the use of flower boxes at ground level and at the foot of the curved windows. There is no doubt that the building makes a notable contribution to the architecture of the High Street.

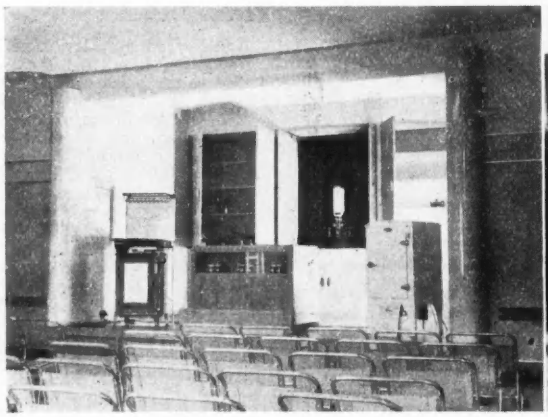
On entering the showroom one is at once impressed with the bright and colourful interior with the walls panelled in walnut to dado height and a new wood called Avodire above; the dado has black ebonized mouldings running horizontally, the whole forming a suitable background for the display of the various gas appliances. The setting of the coke grate in the centre of one wall and the gas fire surrounds are carried out in walnut and black ebonized wood, the same treatment applying to the showroom furniture and counter; the latter is particularly pleasing with its chromium grille in front of the cashier's desk. A comprehensive water heating section is, of course, included, a feature of this being the fact that the panels on which the various heaters are set and the service pipes are easily accessible from a corridor behind, it only being necessary to unscrew sections of the wall to get at the back of the display. In the showroom and, indeed, throughout the building, the joinery is noteworthy, displaying the use of various woods in simple but effective manner. The floor is of teak jointed with green material, this colour being used for the upholstery of the furniture.

The lighting fittings contribute towards the general scheme, particularly attractive being the fibrous plaster ventilating grilles.

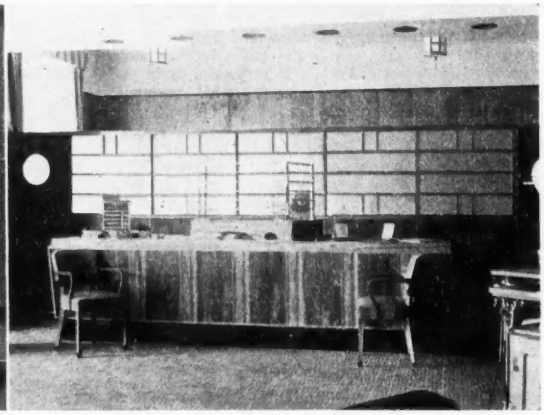
Behind the counter is a small showroom office, divided from the showroom by means of a walnut screen. Flanking the hot water display are two interviewing rooms where business may be carried out in privacy. The window, counter, and water heating section are illuminated from concealed lighting, while the exterior will be floodlighted.

Demonstration Room.

To reach the Demonstration Room on the first floor, one passes up a teak staircase with a black wood panelled dado, above which the walls are painted in a delicate purple shade, this colour scheme being apparent in the curtains to the large window. At the head of the stair a spacious landing treated decoratively in the same manner leads to the Demonstration Room. The first thing the visitor observes is the fine proportions of this room and the general air of lightness accruing from the front windows and a ceiling laylight. The curved angle window treatment is continued by the curved walls of the other two corners, finishing with sunk circles in the ceiling and elegant lighting fittings. The walls are treated to frieze height with a texture plaster and plaster paint of a powder blue colour diminishing in intensity towards the top. The woodwork of this room is carried out in light oak, particular attention being drawn to the radiator casing under the windows, the platform front, and cupboard fitment at the back of the platform. The floor is also of oak. A series of fibrous plaster grilles are set in the frieze on which the figure of Mr. Therm has been ingeniously incorporated. The Demonstration Room has chromium tubular seats with blue upholstery. The lighting of the platform and the room itself, apart from the



The Demonstration Platform.



Counter and Cashier's Desk.

corner lighting fittings, is of the concealed type. A Demonstrator's kitchen opens off the platform.

The staff rest room and the ladies' cloakroom accommodation are also on the first floor.

The remainder of the building consists of the ground floor offices and store accommodation, where the comfort and convenience of the staff have been well provided for in conjunction with an efficient layout. There is a spacious general office, Local Manager's office, subsidiary offices, workshops, &c.

A feature of the building is the fact that all pipes and services are concealed, being hidden in readily accessible ducts. The heating is by means of a Crane coke boiler feeding a low-pressure hot water system, the radiators being set flush with the walls with two small grilles in each case to mark their presence. There is overhead heating in the stores with the addition of panel radiators adjacent to the work benches.

A caretaker's flat is situated on the first floor over part of the offices, while a passageway runs alongside the building to a yard at the back, providing access for motor vehicles direct to the stores and workshop. Beneath this yard, approached by means of two "manholes," is an air raid shelter capable of accommodating about forty persons.

The Opening Ceremony.

To mark the opening of the new premises, a luncheon was held on May 17 in the Demonstration Room, when Mr. FRANK H. JONES, M.Inst.C.E. (Chairman of the Company), presided, supported by Mr. B. R. Green (Deputy Chairman), Mr. T. Brown (General Manager and Secretary), Mr. V. Simmons (Engineer), Mr. J. A. Gould (Distributing Engineer), Mr. W. V. Chapman (Sales Manager), and other senior officers of the Company. Among the guests were Mr. F. W. Moore, J.P. (Chairman of the Orpington Urban District Council), and Mrs. Moore, other members of the U.D.C., and local officials.

Proposing the toast of "The Guests," the CHAIRMAN said that in the short period since the South Suburban Company had opened their first showroom in the district Orpington had grown in a really amazing manner. Since the formation of the Urban District Council in 1934 development had been speeded up enormously, and fortunately for its inhabitants that development had been controlled by the Council with a wisdom and breadth of view the effects of which were to be seen in the many admirable buildings which now adorned the town. The Company hoped and believed that this new building—honoured that day by a civic opening—would be considered, while conforming generally with the style of neighbouring architecture, to be not without an individuality of its own.

The building, went on Mr. Jones, was designed by the Company's Architect, Mr. Brian Hackett, A.R.I.B.A., and they felt that they had produced something of which they might feel proud and with which the Council, justly critical of buildings erected in its area, might well feel satisfied. They had endeavoured to make the premises as attractive and convenient as possible, and every consideration had been given to the comfort and convenience of the staff and to the provision of all possible means for the efficient performance of their work. Mr. Jones expressed the Company's sincere thanks to the Chairman of the Council for so kindly accepting the invitation to open the new premises, to the members of the Council who were present on that occasion, and to the officers of the Council with whom it was the Company's privilege to come into frequent and friendly contact in the course of business. They felt that their new building could not have commenced its career under happier auspices, and they hoped it would justify its existence by ministering largely to the comfort and convenience of the inhabitants of this important district.

The CHAIRMAN of the U.D.C. thanked Mr. Jones for the kind manner in which he had proposed the toast and expressed the guests' appreciation of the Gas Company's hospitality. They were very much impressed, he said, with the architecture of the new building; it was a definite contribution to the High Street and fitted in admirably with the Council's scheme. They were doing their best to make the High Street worthy of the important town that Orpington was now in process of becoming, and a contribution of this sort was of very great value to the district. The Gas Company in a public-spirited fashion had given up without charge to the Council the strip of land which formed the forecourt, and this would be incorporated in the highway for the benefit of the residents. The Council were very grateful indeed to the Company for playing its part in the general welfare of the district by making this contribution. He had much pleasure in declaring the showrooms open and wished the Company prosperity in their new venture.

Mr. Moore went on to propose the toast of "The South Suburban Gas Company." After referring to the magnitude of the Gas Industry, he observed that the South Suburban Company was a large part of that Industry, covering as it did an area of

General View of the Interior.

250 square miles. The Gas Industry was an example to other industries in that it was the first to have a system of co-partnership, which gave stability to the Industry and led to greater satisfaction among the workpeople.

He went on to refer to the extremely satisfactory relationship which existed between the Company and the Urban District Council. The Company maintained 1,400 street lamps in the district and had been actively concerned in devising schemes for the improvement of the public lighting. The new lamps in the High Street were the result of the co-operation of the Company in consultation with the Council. In conclusion, Mr. Moore said how fortunate the Company were to have Mr. H. F. Glass as their Local Manager. He was a business man and was actively concerned with local affairs. The Council urged residents to shop locally, and through Mr. Glass they were enabled to do so.

The CHAIRMAN thanked Mr. Moore for his remarks and expressed appreciation of what he had said in regard to their Local Manager. Mr. Glass was typical of the Company's aims; the Local Manager, like the bank manager, was not a man to be frightened of, but rather one to be looked upon as a friend. Once again he thanked all their guests for their presence that day in support of the Company's new venture.

A.R.P. Notes

Protecting Employees.

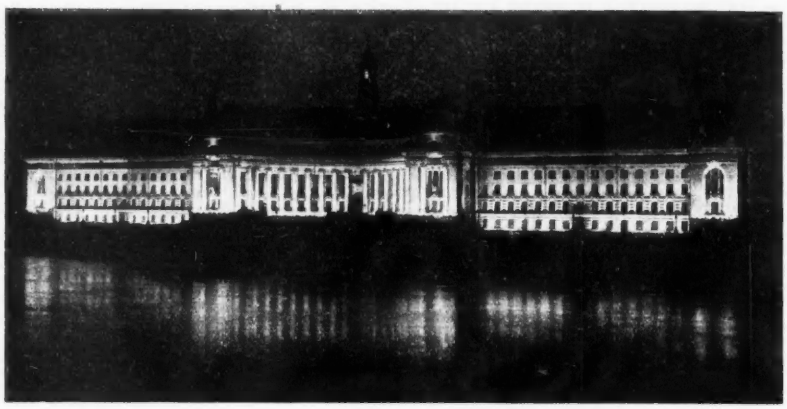
The Leeds Factory of the British Screw Company has what is considered to be one of the finest bomb-proof and gas-proof air raid shelters yet built in this country for workpeople.

It will hold the whole staff at the works. It cost £1,500, which works out at exactly £6 a head for the 250 people it will accommodate. Its roof is made of a 5 ft. thickness of concrete reinforced by 150 tons of old tram lines. According to official instructions this will "kill" all incendiary bombs and effectively stop high explosive bombs weighing not more than two hundredweights.

The shelter is the result of the enterprise of a young Director, Mr. Brian Dean, B.Sc. He started plans on the shelter a fortnight before the crisis broke out last September. A feature is the gas-proofing and air-filtration device installed by Mr. J. R. Marsden, of Controlled Fumigation, Ltd., Institution Street, Leeds.

The entrance to the shelter is like the entrance to an enormous safe. You go down some wooden steps and are confronted by an armour-plate door with a spy-hole in the centre. This leads into the air-lock. Another door leads into the decontamination room equipped with bins fitted with rubber-jointed lids, and overhead tank of water, first-aid devices, and bins of temporary clothing. A first-aid squad will deal here with anyone contaminated with gas and from this room decontaminated persons will be allowed to pass into the shelter proper—three wide connecting corridors about 60 ft. long.

In the largest of the corridors is a device looking rather like two tandem bicycles side by side and without their wheels. While the city's electrical supply still functions, an electrically-driven fan drives fresh filtrated air through the three chambers, but the double tandem is there so that four men may operate the fan by hard pedalling the moment the electricity supply fails.

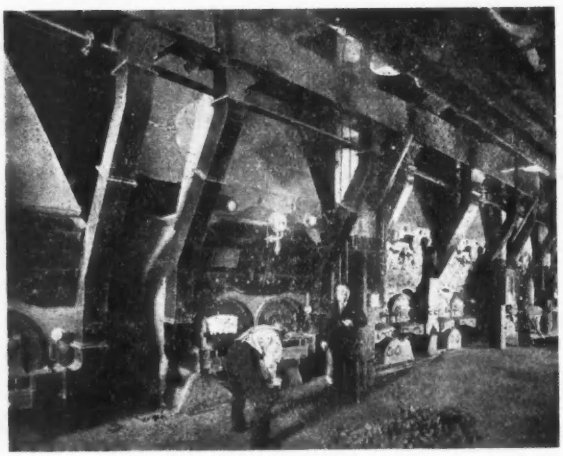


Gas Coke Heats London's County Hall

A NOTABLE triumph for gas coke is the huge central heating plant lately installed at the London County Hall—a triumph not only by reason of the fact that one of the most modern buildings in the Metropolis thus becomes "smokeless," but also because the choice which brought about this result lay with an Authority whose acknowledged ideal is the "smokeless city." There is, indeed, probably no public authority more keenly concerned with the elimination of smoke emission from factory and fireside than the L.C.C. By selecting smokeless fuels for their numerous hospitals and institutions, the Council set an example of how their own smoke abatement regulations should be observed—regulations which are enforced by more than thirty Borough Authorities with commendable impartiality and persistence.

Until the year 1925, the boilers at County Hall were coal-fired, with all the well-known disadvantages, including smoke and grit emission. At that time the London Coke Committee's proposal to substitute smokeless gas coke as fuel was met with the usual scepticism and prejudice; but in February of that year facilities were granted for conducting scientific comparative cost and efficiency tests with coal and coke—under the ægis of the London County Council Engineer.

The coal test revealed the extraordinary high thermal efficiency of 82·5%. Over a test period of 80¼ hours the corresponding thermal efficiency with coke as the exclusive fuel was 84%. In addition, there accrued a saving on fuel cost amounting to £20 per week, while incidental savings of a very substantial character on flue, window, roof, and gutter cleaning have since become apparent. The adoption of coke as fuel at the County Hall, as a result of these official tests, has led to its use for steam raising, heating, as well as in open grates, in L.C.C. institutions to the present annual consumption of more than 100,000 tons; and in developing their new housing estates the Council install, wherever possible, open grates designed for use with coke.



A View of the Battery of Boilers.

Extensions Necessary.

With the vast growth of the Council administrative responsibilities, considerable extensions to the County Hall became necessary, including the erection of a new building behind the existing one. To provide for the heating requirements of these extensions it was decided to re-build the existing plant to cope with the additional load rather than erect a second boiler-house. And as a result of their successful experience with coke in the previous plant, the same fuel was decided upon for the extensions, involving the replacement of the six multi-tubular boilers with larger units—which have been in operation for a little over a year.

Messrs. Cochran & Co. (Annan), Ltd., were the main contractors for the new boiler plant, and the new units consist of their "Sinuflo" super-economic type in which the firm's well-known principle of sinuous tubes are embodied. Five units were installed for the water heating system, the sixth being coupled up with the two previous John Thompson steam boilers which have not been dismantled. The new steam boiler is rated at 9,000 lb. of steam per hour at a pressure of 60 lb. per sq.in. from feed water at 160° F. Each of the five "Sinuflo" boilers is rated at 9,000,000 B.Th.U. per hour, compared with the rating of the original boilers of 5,000,000 B.Th.U. on normal load and 7,000,000 B.Th.U. on maximum load.

The six boilers are equipped with Crosthwaite fixed forced-draught furnaces, each furnace consisting of a number of transverse firebars with orifices forming a series of tubes along the length of the grate. The supply of air for forced draught passes through these tubes, thereby becoming heated while simultaneously preventing the firebars from becoming overheated. The air is normally supplied by steam jets, but a Howden fan is available if required.

The furnaces are hand-fired, gas coke being delivered by lorry to bunkers beneath the courtyard, whence it is handled by barrows. A further innovation is an ash-handling plant, consisting of a large collecting chamber, into which all the dust and ashes are drawn by vacuum. A central point is provided having a grating where the ashes may be dumped, the smaller ash passing into the suction pipe blow. Large clinker is retained and periodically transferred to a brick-crusher nearby to reduce it to a satisfactory size. From this point the line passes into the courtyard immediately above and up to the top of the ash-collecting chamber, where it is delivered at an angle to the top plate, thus setting up a swirling effect which causes the ash to pass down the sides of the collecting chamber while the air exhausts out at the centre. A 5 in. ash suction pipe is installed. Arrangements have also been made to collect any dust which may accumulate in the boilers themselves. For this purpose a 3-in. dust-collecting pipe is provided having a line across the front and at the back of the boilers. Four flexible hose connexions are available in each line, and the dust is carried to a point in the ash-collecting pipe adjacent to the collecting chamber. The ash and dust collecting lines are each fitted with valves.

An Eight-Hour Test.

Details of the following test are taken from the *Steam Engineer*, from which some of the other particulars are also obtained. Both the steam and hot water boilers were subjected to careful tests, the result being that more than 80% efficiency on the net calorific value of the fuel was recorded.

A trial was run on Nos. 4 and 8 hot water boilers between the hours of 9 a.m. and 5 p.m. on Sunday, Feb. 20, 1938.

Type of Boiler: Cochran Kirke indued draught "Sinuflo" super-economic.
Size of each Boiler: 8ft. 6in. dia. by 15 ft. 8 in. O.T.P. Two flues, each 3 ft. dia.
Heating surface: Tubes 1,072 sq. ft. Total, 1,318 sq. ft.
Grate Area: 34·4 sq. ft.

Water circulated per hour	1,107,510	lb.
Flow temperature average	162·2	° F.
Inlet temperature average	145	° F.
Average load	18,950,000	B.Th.U. per hour
Rated load	18,000,000	B.Th.U. per hour
Overload	5·32%	
Coke fired per hour	No. 4—922·5 lb. No. 8—945 lb. }	Total, 1,867·5 lb.
Calorific value gross	12,430	B.Th.U. per hour
Calorific value net	12,406	B.Th.U. per hour
Clinker and ash per hour	No. 4—91·4 lb. No. 8—91·1 lb. }	182·5 lb.

Flue gas Analysis.	By Vol.	By Weight.
CO_2	15·8%	22·6%
O_2	5·1%	5·3%
CO	*Nil*	*Nil*
Excess air	30%	

	No. 4.	No. 8.	Average.
Combustion chamber temp.	932° C.	976 °C.	954 °C.
Flue Gas temperature	378° F.	386° F.	382° F.
Smokebox draught, in.	1·4 W.G.	1·56 W.G.	
Draught over fire, in.	0·05 W.G.	0·10 W.G.	
Steam jet consumption	297 lb. per hour per boiler		

Heat Balance per Pound Fuel as Fired.

	B.Th.U.	%
Heat to water	10,150	81·6
Chimney lose dry flue gas	1,035	8·33
Loss to incomplete combustion	0	0
Loss to moisture in flue gas	22	0·18
Loss due to carbon in ash	220	1·77
Radiation and unaccounted for	1,003	8·12
	12,430	100·00
Efficiency of net calorific value	81·76%	

Three Weir vertical pumps are installed for the boiler feed for the steam boilers, the exhaust steam from the pumps passing to a feed-water heater. The new steam unit is also fitted with a "Hilo" alarm and thermo-feed boiler feed-water regulator. In addition to supplying a small amount of steam to the feed pumps and steam jets, when in use, the greater part of the steam is used in conjunction with the cooking, air-conditioning, and plenum heating systems, as well as the hot water services for washing and kitchen requirements. These latter are obtained from two calorifiers supplied with live steam from the boilers, each having a heating surface of 150 sq.ft. A water-softening plant treats all water used in the hot water service and boiler feed. Thermostatic controls maintain the water in the calorifiers at 160° F.

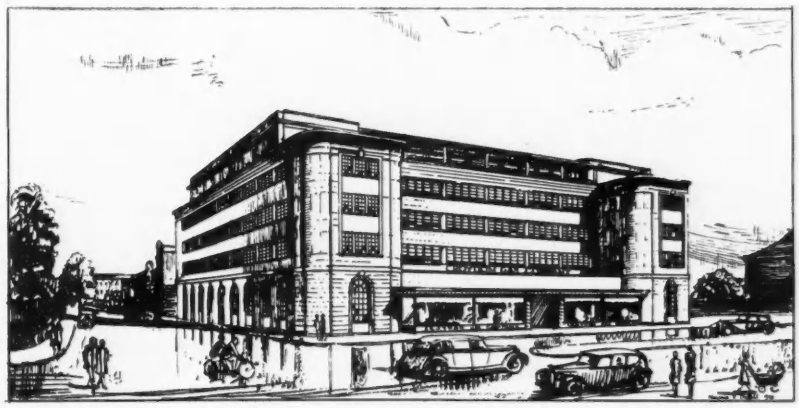
Two circulating pumps, electrically-driven, are used to circulate the water to the whole of the hot water services. Every advantage is taken to return the condensate back to the boilers, return lines from the calorifiers, air-conditioning plants, and plenum plant leading back to two vacuum pumps delivering direct to the condensate tank.

The heating system is assisted by four circulating pumps, additional pipe-lines having been added to include the new extensions, so that the whole load is connected on to the system. Further circulating pumps have, however, been installed in the new building. Approximately 3,600 radiators are in use in the existing buildings, and it is anticipated that with the new extensions the number will be increased to about 5,300.

For recording the performances of the plant a large instrument panel has been fitted, records being kept of the total steam flow, flue gas temperatures, as well as temperatures of the flow and return on hot water system and calorifiers. Flow meters also record the total water circulated per hour. The Council's laboratory department also take periodical tests of both water and fuel. As an indication of the close observation kept on the temperature of various parts of these vast buildings, a 60-point Negretti & Zambra multi-point temperature indicator is installed in the instrument room, which it is proposed to extend to 120 points with a recording instrument so that records of any six points may be taken when desired.

It may be mentioned in conclusion that the main entrance halls are heated by open coke grates.

Croydon Looks Ahead



THE Chancellor of the Exchequer does not as a rule "anticipate his Budget statement." Nor does the "JOURNAL" make a habit of anticipating, by other than perhaps the briefest announcement, the intentions of gas undertakings in regard to their extension programmes. But when a leading undertaking takes so important a step as the complete re-building of its headquarters—and when the Architect's drawing shows the new premises to be of such an outstanding character—we feel that a few notes in advance of the constructional work may not be out of place.

We reproduce in the accompanying illustration the Architect's drawing of the new Head Offices and Showrooms of the Croydon Gas Company, and it is worthy of note that Mr. William G. Newton's drawing of the elevation has been accepted and is hung in this year's Royal Academy. It may be mentioned that the new frontage will be on Park Lane, the south side of the buiding extending along the line of the original Head Office frontage in Katharine Street. The new building will overlook what is at the moment a wide stretch of open ground belonging to the Corporation and at present utilized as a car park. Should this piece of land subsequently be developed by the Corporation—such, for instance, as by the erection of new Municipal Offices—the position of the Gas Company's Headquarters opposite will be still more enhanced.

We note from an article in the April number of the *Croydon Co-Partner* that the first section of original offices in Katharine Street, the site of which has now been largely cleared, was completed in 1880. The brick building still stands to-day; and it is a curious fact that the outside wall on one side has again become the outside walls of the offices, as they now are, following the demolition. The first extension was made in 1906, when the tiny showroom was demolished and new buildings erected. Provision was made for a new showroom, which has been in use up to the present time, and this part of the building was made identical with the original premises, and an imposing entrance formed between the two. In 1912 it was decided to enlarge the office accommodation and provide a Board Room, Lecture Theatre, and a series of show cases extending as far as the corner of Park Lane. In 1913 the offices, as they stood until recently, were completed.

During the process of demolition the inconvenience caused to the staff working at Katharine Street was not as great as had been anticipated, and the work was completed without any untoward event. It will be recalled that a considerable proportion of the Head Office staff have moved into temporary premises nearby. The gradual disappearance of Park Terrace, as the row of old houses fronting on Park Lane was called, and the end buildings in Katharine Street caused a large amount of local interest, and several comments and photographs appeared in the local Press.

The new premises, which, as we have said, will front on Park Lane, will consist of a five-storey building, the ground floor of which will be in stonework and the remainder in Schokbeton slab incorporated with the reinforced concrete structure.

The ground floor will be mainly devoted to a large showroom, where the latest gas appliances will be displayed and facilities provided for payment of accounts, requests for service, &c. There will also be another showroom in the basement, which will be principally used for the exhibition of large scale cooking and water heating equipment. On the ground floor directly leading from the showroom will be a large Lecture Hall where regular cookery demonstrations will be given.

Provision will be made for the administration offices of the Mains and of the Sales and Service Departments on the first floor, and the second and third floors will be devoted to the Accounts and Secretary's Departments respectively. The top floor will be principally occupied by the Board Room and Chief Officers' offices; these being all linked together by an external gallery, joining the Board Room at one end to the General Manager's Office at the other.

The corner of Katharine Street and Park Lane now presents an appearance very different from that which the residents of Croydon have been used to for so long; and in due course they will see a building on the site worthy of the traditions of the Croydon Gas Company, and one which, architecturally, will be one of the features of the Borough. The foregoing was expressed in the issue of the *Croydon Co-Partner*, to which we have already referred, and to it we would add that the new Headquarters of the Company will also be fully in keeping with the traditions of the Gas Industry as a whole, and will, indeed, add not a little to the prestige of both Company and Industry.

The Midland Association of Gas Engineers and Managers

Members of the Midland Association have explained to them the method of bagging off of large gas mains in an emergency. The bag can be seen lying across the wooden platform, beneath which is a section of 30-in. main with valve and standpipe fitted

On May 18 a large muster of members of the Midland Association of Gas Engineers and Managers honoured their President, Mr. G. C. Pearson, Chief Engineer of the Birmingham Gas Department, by accepting his Committee's invitation to hold their Spring Meeting at Birmingham.

The morning was spent inspecting the Windsor Street Gas-Works, where the members had the opportunity of seeing many of the A.R.P. measures which Mr. Pearson described in his Presidential Address. These include methods of guarding windows against splinter and blast, underground shelters and metal shelters for key men, additional fire pumps, and a complete decontamination centre, where demonstrations were given of emergency equipment and of removing contaminated clothing.

The Windsor Street Works were transferred to the Corporation from the Birmingham Gas Light Company in 1875, and since that time they have been developed until they are to-day the largest municipally-owned gas-works in the country. During that period the area of the works has been extended from nine acres to 26 acres. Railway and canal facilities are available. The gas-making capacity of the works is now 26 million cu.ft. per day of coal gas and 9 million cu.ft. per day of carburetted water gas. Coal requirements vary between 820 tons in the summer and 1,500 tons per day in the winter, while the total coke sales are between 450 and 800 tons per day.

The carbonizing plant comprises five ranges of Woodall-Duckham continuous vertical retorts in a retort house 487 ft. long by 210 ft. wide. The total number of retorts is 242.

The carburetted water gas plant consists of three Humphreys & Glasgow machines of the latest completely automatic type with a capacity of 3 million cu.ft. per day each.

The storage at the Windsor Street Works is as follows: One five-lift holder of 5 millions capacity and two three-lift holders of 6,500,000 millions each, giving a total of 17,500,000 cu.ft. These holders are fitted with Widlake distant holder stock indicators, the gas stock being indicated in the booster house at any time. Experiments in regard to camouflaging the holders are in hand, and a model of a camouflaged holder was shown to the visitors.

Part of the works' electrical power is generated from steam raised by waste heat, while auxiliary supply is obtained from the city electric high-tension supply through two 312 k.va. transformers. A tar dehydrating plant is capable of producing 20 tons of prepared tar per day; storage accommodation is provided for 50,000 gallons, and hot tar is delivered into special vehicles for direct application to the road. A testing works with a capacity of 3 million cu.ft. per day are arranged for the purpose of assessing the efficiency of any of the carbonizing plants. Representative sections of retorts can be isolated by special foul mains and products measured and evaluated.

At the Windsor Street Works is a section of the Industrial Research Laboratories containing the most modern type of muffles and annealing furnaces for carrying out investigation work on a large scale for the benefit of manufacturers. For the upkeep of the plant there are carpenters', blacksmiths', and fittings shops situated in a central position. The departmental garage for cars and lorries is situated adjacent to the works, with accommodation for 52 vehicles, complete with washing and repair facilities. Experimental work has been carried out on compressing gas for use as a substitute for petrol in motor vehicles, and a multi-stage compressor, capable of imparting a pressure of 8,000 lb. per sq.in. to the gas, is installed in the exhauster house. A pipe line connects this apparatus to a charging station at the garage. Certain departmental vehicles have run successfully on this fuel, and a supply of cylinders is maintained at the garage.

Guests of the Gas Committee.

Following the inspection of the Windsor Street Works, members and guests to the number of about 150 sat down to luncheon in the Conference Hall of the Lord Street Offices at the kind invitation of the Birmingham Gas Committee, whose Chairman (Councillor A. S. GILES, O.B.E., M.C., J.P.) presided. Among those present was the Right Worshipful the Lord Mayor of Birmingham (Alderman James Crump, J.P.).

Proposing the toast of "The City of Birmingham," Mr. GEORGE DIXON referred to the city's early connexion with the Gas Industry through William Murdoch, whose works were in Birmingham. There were over 1,200 different trades carried on in Birmingham, giving employment to more than a million people, while the city had given a lead in the matter of municipal government. They had a very live Chamber of Commerce of which they saw something each year at the British Industries Fair. After mentioning many of the city's other amenities, Mr. Dixon referred with pleasure to the presence on that occasion of Alderman Lloyd, for many years Chairman of the Birmingham Gas Committee and a friend of everybody connected with the Gas Industry in the district. His mantle had fallen upon Councillor Giles, and, as an Association closely associated with Birmingham, they were not at all dissatisfied with the Council's choice. In him they recognized another friend, and they had already given him some work to do in the Industry as Chairman of the Midland Executive Board of the National Gas Council; they trusted he would long remain to assist the Industry in the Midlands. It was always a delight to go to Birmingham, went on Mr. Dixon, where they always received ready assistance and advice and where the true team spirit was very evident; in their General Manager and Chief Engineer they had two officers who did not fall out as to whose job was the more important. He wanted to emphasize how much they depended upon this team spirit at Birmingham—which they had copied in other parts of the Gas Industry. In conclusion, Mr. Dixon expressed appreciation of the presence of the Lord Mayor and of the fact that he had found time in the midst of his busy life to give them the pleasure of his company.

The LORD MAYOR OF BIRMINGHAM, responding to the toast, thanked Mr. Dixon for his kindly reference to Alderman Lloyd, the "father" of the Council, who was loved and respected in Birmingham's municipal affairs. Continuing, Alderman Crump voiced the Council's pleasure at Mr. Pearson's election to the Presidency of the Midland Association. They in Birmingham recognized his capabilities. The team spirit to which reference had been made extended to all departments of the Corporation. When Birmingham decided to extend its interests to the electrical side, some members of the Council were sceptical about spending more money on the Gas Undertaking. But their fears were groundless, because every year, when they read the Annual Report of the Gas Department, it was found that they were still

going ahead, and Councillor Giles kept coming forward for more money for extensions. Having referred to the magnitude of the Gas Industry, Alderman Crump spoke of the debt of gratitude which was due to the Industry for introducing many new and labour-saving ideas. Once again he thanked Mr. Dixon for his kindly references to Birmingham and expressed the hope that under the guidance of their President, Mr. Pearson, the Association would progress as Birmingham had progressed during the past century.

Councillor A. S. GILES proposed the toast of "The Midland Association of Gas Engineers and Managers," and said how pleased the Committee were to see so many members there on that occasion. Among these was their senior past-President, Mr. W. S. Morland. It was 62 years ago that Mr. Charles Hunt, who was Engineer at the Windsor Street Works, was elected as the first President of the Association; and their present President had been in charge of those same works before he became Chief Engineer of the Birmingham Undertaking. It was as far back as 1878 that Mr. Hunt gave his Presidential Address—at a time when there was some concern in the Gas Industry about electric lighting which was then being developed. Councillor Giles observed that it would not be out of place to say that this concern had never amounted to much since that year; indeed, a certain degree of gratitude was due to their electrical friends in that they caused the Gas Industry to keep up to the mark. The Midland Association, he said in conclusion, had accomplished and were accomplishing a great deal, and he congratulated them on electing Mr. Hunt and Mr. Pearson as their Presidents.

The PRESIDENT thanked Councillor Giles for the delightful way in which he had proposed the toast as well as for presiding over that gathering. The Midland Association had been fortunate in that the Chairmen of the Birmingham Gas Committee had always taken an interest in their affairs. From the days of Joseph Chamberlain to Alderman Lloyd and Councillor Giles the Chairmen had always been identified with the Gas Industry. The last-named took a very keen and live interest in the activities of the Midland Association, while they looked with pride upon the part he was playing in civic life. Alderman Lloyd was revered and honoured in their Association. Mr. Pearson expressed his thanks to the Chairman of the Gas Committee for the arrangements made for their visit that day as well as for their hospitality. That this was appreciated was emphasized by the numbers who had turned up, and was further evidence of the consideration which had been meted out to him. In conclusion, Mr. Pearson offered a special word of welcome to the visitors, among whom he mentioned Mr. Dixon (Senior Vice-President of The Institution of Gas Engineers), Mr. Morland, their senior past-President, Mr. R. G. Shadbolt (a past-President of the Institution), Dr. E. W. Smith and Mr. R. J. Rogers, who had previously been his colleagues in the Gas Department, Mr. H. E. Stone, of the Colombo and Hong Kong gas companies, Mr. A. L. Holton, Chief Engineer of the Manchester Gas Department, and his brother Councillor Donald Pearson.

Presentation to Retiring Secretary.

Mr. F. DAVIES (Walsall) thereafter made a presentation from the Association of a pair of silver candlesticks and a silver salver to Mr. J. H. Patterson who recently retired from the office of Hon. Secretary and Treasurer. Though he had now left the Industry, said Mr. Davies, he left behind him many friends to wish him prosperity in his new walk of life. One had to go through the office of President in order to appreciate the amount of work which the Hon. Secretary had to do, and they were making this presentation to Mr. Paterson not merely as a token of their gratitude, but as a reminder that he had left behind him nothing but friendship.

Mr. PATERSON, in acknowledging the presentation, observed that as one went through life old friends and associations loomed more and more in importance, and this presentation would be a reminder of all his very dear friends in the Midlands. His three years as Secretary of the Association had been most enjoyable ones, and the co-operation he had received from all the members had made his work very pleasant. The Association could not have made a better choice than Mr. Wainwright as his successor; everything Mr. Wainwright undertook he carried out with energy and enthusiasm, and with him as Secretary the affairs of the Association would be conducted with efficiency and dignity. In conclusion, Mr. Paterson wished the Association continued success and happiness.

Mr. C. F. W. RENDLE (Redditch), in proposing a cordial vote of thanks to Councillor Giles, said they never sought Birmingham's advice without receiving courteous attention and satisfaction, and this was in no small degree due to what he described as the "get-at-ableness" of the officials of the Gas Department.

Councillor GILES, responding, said that it was a great pleasure to be among so many friends in the Gas Industry. Whatever they had said about him applied equally to his colleagues on the Gas Committee. They were an excellent team, and all of them were so thoroughly "soaked" in gas that whenever another form of light, heat, or power came up for consideration by any other Committee of which they were members, they saw to it that the advantages of gas were put forward. They also acknowledged the able support of their officials; in Mr. A. W. Smith and Mr. G. Pearson and many other responsible members of the Gas Undertaking the Committee had very good friends—as they were of the Gas Industry as a whole.

Controlling an Ignited Gas Main.

After luncheon the members were conveyed to the Distribution Pipe Store Yard of the Birmingham Gas Department at Duddeston Mill Road where a practical demonstration was given of the method of bagging off a large gas main which has become fractured. The method, which was developed by Mr. R. G. Marsh, was fully described, with diagrammatic illustrations, in the "JOURNAL" for Nov. 16 last, and during the demonstration a running commentary through a loudspeaker was given by way of explanation of the procedure adopted.

A short 12-in. service from a 30-in. trunk main conveying gas at about 7 in. pressure has been laid in the Pipe Ground. Immediately on the outlet of the control valve is a reducer from 12 in. to 30 in., and a length of 30-in. main is laid underground for a distance of about 74 ft. The 30-in. main terminates with an open end at a point where the ground falls away slightly, so that the opening is partly in a shallow depression. At the end of the 30-in. main near the 12-in. valve is fixed the special Marsh saddle with standpipe to admit of the bag being inserted.

Before the demonstration on this length of main, the method of bagging-off was explained with the help of a short independent length of 30-in. main, through which the members were enabled to watch the process of inserting and in-

In the left-hand photograph the flames can be seen rising from the open end of the 30-in. main before the bagging device brings the fire under control. On the right men are about to insert a circular rubber plunger into the open end finally to extinguish the flames which have already been reduced by the inflated bag.

flating the bag. It should be mentioned that on either side of the valve a rod is inserted across the diameter of the main which has the effect of arresting any slip in the bag by reason of the gas pressure on one side or the other. Moreover, when the partially inflated bag is pushed by the gas pressure against the farther rod the contact causes the bag to expand laterally and complete the shutting off of the gas.

The method having been explained, the demonstration was carried out on the live main. In order to ensure safety in igniting the very large volume of gas escaping from the open end, a flat wrought-iron plate, hinged at the bottom, is provided at the open end in such a way as to allow of a comparatively small volume of gas to be issuing at the moment of ignition. When the gas has been ignited by means of a taper attached to the end of a long pole, the hinged flap is dropped and the supply turned on until the maximum amount of gas which can be safely allowed to pass will be burning at the open end. It will, of course, be appreciated that the volume, when spectators are present, must be governed by the wind conditions at the time of the experiment. On a calm day, with the control valve only partly open, the flame is of such huge dimensions that it reaches a height of considerably over 30 ft. Thus, if weather conditions are gusty it may not be safe either to spectators or adjoining property to turn on too much gas. The Midland Association were treated (at a safe distance) to a very spectacular burst of flame before the volume was brought under control by the bagging device.

As soon as the flame was reduced by the bag to approachable proportions, a gang of men stopped up the end of the main by means of clay, and the flames were thus finally extinguished. The whole operation was completed in a surprisingly short space of time.

The main was subsequently ignited again and a different method of sealing off demonstrated. This consisted of inserting a rubber plunger on the end of a long rod into the open end so soon as the bagging device had reduced the flames to reasonable proportions.

The members then returned to Lord Street where they inspected the meter and fittings stores, repair shops, &c., after which tea in the Conference Hall brought a day of exceptional interest to a close.

The Women's Gas Council - - - -

On the platform at the Annual Meeting—*Left to right*, Miss K. M. Halpin (Organizing Secretary), Lady Milne-Watson (Vice-President), presiding, and Miss Wolseley-Lewis (Chairman of the Executive Committee).

Fourth Annual Meeting

The Fourth Annual General Meeting of the Women's Gas Council was held at Gas Industry House on Thursday, May 11—the chair being taken by Lady MILNE-WATSON (Vice-President).

OPENING the proceedings, Lady MILNE-WATSON expressed her appreciation of the honour which had been done her in asking her to preside at that meeting—particularly when they already had such an able Chairman in the person of Miss Wolseley-Lewis. However, she was very glad to have this opportunity of meeting the members, especially as last year she had been unable to attend the Annual General Meeting, which had been a great disappointment to her.

The ORGANIZING SECRETARY (Miss K. M. Halpin) announced apologies for absence from, among others, the following: Miss Adler, Mrs. W. A. Cadbury, the Viscountess Davidson, Lady Emmott, Countess Jellicoe, the Countess of Limerick, Mrs. Warren Pearl, Dowager Lady Steel-Maitland, and Lady Chatterjee.

The Minutes of the last Annual General Meeting having been taken as read and duly confirmed and signed, the CHAIRMAN called upon Miss Halpin to submit the Annual Report.

Continued Expansion.

Miss K. M. HALPIN dealt with the salient points in the Report, concluding with a word of thanks to Miss Wilson and Miss Page for so ably carrying on the work of the Council during the period she herself had been engaged on Government activities.

The following points of interest are reproduced from the Report:

The fourth year of the Women's Gas Council has been one of growth and expansion. Fresh branches have been formed and over 4,000 new members enrolled in spite of the unsettled state of international affairs and the consequent feeling of insecurity.

Miss Halpin's work in connexion with Women's Voluntary Service proved so valuable that we were asked to extend the time of the original agreement and consented to do so. During these months she has kept in touch with our work and we are now looking forward to having again her full time supervision. The smooth running of the office during her absence is a testimony to her own work and that of her assistants, Miss Wilson and Miss Page, who have been indefatigable in carrying on the work of the Council. We are also able through our Secretaries to help in the formation of an Emergency Register of women qualified to do administrative work in War time which is being formed by the Women's Employment Federation in co-operation with the Ministry of Labour.

New Branches.

We are able to report a record number of new branches and a total membership of 13,000. The following fresh centres have been established: Bow, Burnley, Carmarthen, Dukinfield, Enfield and Winchmore Hill, Frodsham, Helsby, Hyde, Leicester, Littleborough, North Finchley, Romiley, Swindon, and Walthamstow and Leyton. There are now over 600 members in Scotland, and it is hoped to form branches in Glasgow and possibly in Edinburgh in the near future. New branches also will be started shortly at Cirencester, Haywards Heath, and Ilminster.

During the year the Women's Gas Council has been represented on the Councils or Committees of a number of national organizations.

Throughout the British Empire Exhibition at Glasgow the Women's Gas Council exhibit in the Women of the Empire Pavilion had a constant stream of interested visitors. Our staff there were kept busy answering questions on household matters: demonstrating the use of modern gas appliances and explaining the work of the Women's Gas Council.

On the opening day Her Majesty the Queen visited the Women's Gas Council Exhibit, and Miss K. M. Halpin was presented. The Queen was particularly interested in the model kitchen and asked to have the different gas appliances explained to her.

A few days after the Empire Exhibition in Glasgow closed the Women's Gas Council was represented at another Exhibition, this time in London. In the Mother and Child Section of Woman's Fair our Council had a model kitchen designed by Mrs. Darcy Braddell. Here the latest gas appliances and modern labour saving equipment were shown. Demonstrations were given every day

in this kitchen to show how good planning helps the housewife and as a visual demonstration of how a training in Domestic Science can lead to a career in the Gas Industry. In the Hall of Achievement the Council had a stall for literature where all queries about the work of the Women's Gas Council were answered. On Nov. 23 the Council held three meetings in the Hall of Achievement. Large parties of members came from all over the country, and nearly 1,000 people interested in the work of the Council visited Olympia that day, and attended one or more of the meetings.

Training of Demonstrators.

The Battersea Polytechnic course in Gas Cookery Demonstration, which covers a full year's course of two evenings a week, was continued this year. The syllabus includes voice production, practice in demonstrating, and the knowledge and use of gas apparatus, and is open to students at present studying for a Domestic Science Diploma, and also to those already employed in the Gas Industry. An examination was held in June of last year when eight candidates qualified for the award of the Women's Gas Council Certificate. This Certificate is the necessary qualification for the Diploma, which is given to holders of the Certificate who have completed a minimum period of two years' practical experience in the Gas Industry.

The London and Home Counties Demonstrators' Circle has had a successful year. This year there was no Summer School for Demonstrators, but at the beginning of December the London and Home Counties Demonstrators' Circle organized a week-end Conference, which was attended by over 90 delegates from all parts of the country.

Throughout the year there has been a constant demand for lectures from Headquarters to Branches of the Women's Gas Council, and to other organizations such as the Women's Citizens, the Townswomen's Guilds, Health Societies, Rotary Clubs, and political Women's Associations. The number of lectures given during the last year is more than double that of the previous year. In all cases the subjects have been connected with Domestic Science, Food Values, Kitchen Planning, or Social Work, Infant Welfare, and Housing.

Fanfare in its new form has proved to be popular. Its circulation increases steadily, although the Editor would like to see a more rapid growth. Readers show a great interest in the magazine, and many of the articles have been published in answer to special requests, and letters with queries for our domestic science and beauty experts are numerous.

Lady WOODWARD (Vice-President) proposed the adoption of the Report. She was sure they must have read through it with very great pleasure and with sincere appreciation of the work of Miss Halpin and her able staff. They would also wish to congratulate the Committee upon the many activities of National interest and service which the W.G.C. had been undertaking. Lady Woodward desired to put on record a hearty vote of thanks to these people.

The LADY MAYORESS OF MANCHESTER, seconding, said that although she had visited London on previous occasions, this was the first time she had attended a Conference there. She spoke of the value of such meetings and the opportunity it gave members of learning, by personal contact, what other branches were doing. As President of the Manchester Branch, she was delighted to be there that day, and she was sure she would return to Manchester much wiser than when she left. She thanked them very much for inviting her to the Meeting and had much pleasure in seconding the adoption of the Report.

Miss HALPIN thereafter submitted the Accounts for the past year, which were adopted on the proposition of Mrs. FARDELL, seconded by Mrs. HAMELTON.

Elections.

The CHAIRMAN said that the Marchioness of Londonderry was the only nomination for the Presidency of the Council, and she therefore declared her elected.

Vice-Presidents were elected as follows:

Miss Adler, C.B.E., J.P.	The Countess of Limerick
Mrs. W. A. Cadbury	Sir David Milne-Watson, Bart., D.L., LL.D.
Lady Chatterjee, O.B.E., M.A.	Lady Milne-Watson
Lady Davis	Dowager Lady Nunburnholme, J.P.
Viscountess Davidson, M.P.	Mrs. Warren Pearl
Lady Duckham	Sir Isidore Salmon, C.B.E., D.L., J.P., M.P.
Lady Emmott, J.P.	Lady Steel-Maitland
Miss Faithfull, C.B.E.	Lady Sydenham of Combe
Mrs. A. S. Giles	Lady Woodward
Sir Francis Goodenough	
Lady Humphries	
Countess Jellicoe	

together with the addition of Lady Ruth Balfour proposed by the Executive Committee.

Miss HALPIN stated that the Chairman, together with the following members of the Executive Committee, remained in office in accordance with the constitution:

Mrs. C. E. R. Abbott	Miss M. M. Robinson
Miss O. Humphries	Mrs. H. M. Royle
Mrs. Iredale	Mrs. A. L'Epine Smith
Miss A. M. Mathias	Miss E. Willans, M.B.E.
Mrs. O. Roberts	

while Mrs. Cottington-Taylor, Miss M. B. Francis, Miss E. Kirkby, and Miss Ellington-Wright, M.B.E., retire, but offer themselves for re-election. In addition, Miss Tetlow and Mrs. Eric Evans had been nominated by their respective Branches. There were therefore six nominations for six vacancies, and the last six names were duly elected to serve on the Executive Committee.

Miss HALPIN said that the co-opted members last year were Mrs. Darcy Braddell, Miss Fergusson, Mrs. Eileen Murphy, and Mrs. Marion Clark; their re-election lay in the hands of the Executive Committee at their first meeting.

On the proposition of Mrs. CORDINGLEY, seconded by Mrs. GATES, the Council's Auditors (Messrs. Cash, Stone, & Co.) were re-appointed for the ensuing year.

A Wide Field of Work.

The CHAIRMAN said that before closing the business part of the meeting she was sure the members would like to join with her in expressing their appreciation of the work of the Committee during the past year. The great increase in the number of members and Branches indicated that in spite of the fact that there were many similar organizations open to women there was a definite demand for a body such as the Women's Gas Council, which had such a very wide field of work. All their activities were centred round the home like a star which radiated every interest in steadily widening rays. Lady Milne-Watson thanked her colleagues in all the Branches for their able and energetic work, and also Miss Halpin and her staff for their excellent organization of the Council's affairs.

An Address on the subject of "Family Allowances" was then given by Miss Marjorie E. Green. Introducing Miss Green, who was taking the place of Miss Eleanor Rathbone, M.P., the Chairman said that Miss Green had worked for many years with Miss Rathbone on Family Allowances. She was Secretary of the Family Endowment Council and Secretary of the Children's Minimum Council. In her work Miss Green had been responsible for compiling many reports, and supplying valuable data to people who were interested in the aims and objects of these two Councils. Many Members of Parliament and other people in public life had praised Miss Green for the very reliable information which she had put into her reports. Miss Green had studied Nutrition, and utilized this knowledge in her work for the Children's Minimum Council.

Vote of Thanks.

Miss WOLSELEY-LEWIS, proposing a vote of thanks to Lady Milne-Watson for presiding over the meeting, said that it was not only a great pleasure to welcome her personally on that occasion, but also as the wife of Sir David Milne-Watson, the Governor of the Gas Light and Coke Company, to whom the Women's Gas Council owed a very deep debt of gratitude. A great many of the amenities which they now enjoyed depended upon the generosity of the Gas Industry; and the latest and best token of this was their Chairman's kindness in coming to preside over that meeting. Miss Wolseley-Lewis also expressed the Council's gratitude to the speaker that afternoon. They were sorry that Miss Rathbone had been unable to be present; but they could not but agree that she was very well represented indeed in the substitute she had sent. Miss Green had made a very close study of the subject with which she had dealt, and they hoped that her work might be the seed of some future legislation; they wished her all success in what she believed to be the right method of building up the lives of the children of the future.

Miss Wolseley-Lewis went on to thank the Executive Committee for their zeal, while they were particularly indebted to their Organizing Secretary. Their progress was very largely due to her work. Miss Halpin had divided her interests between two such important organizations as their own and the Women's Voluntary Service—and had done so very successfully Lady Reading, who was Chairman of the latter organization, reported that Miss Halpin's work had been of the greatest value to them; and she had been able to do a great deal of work on behalf of the W.G.C. at the same time. She had been most ably seconded by her co-secretaries, Miss Wilson and Miss Page—so perhaps they would allow her to thank them all.

This concluded the meeting, and the members were thereafter entertained at tea.

Southern Association of Gas Engineers and Managers

Summer Meeting at Plymouth

To visit the Undertaking of their President, Mr. F. Blackburn, who is Engineer and Manager of the Corporation Gas Department, members and their ladies gathered in Plymouth on Friday, May 19, by kind invitation of the Lord Mayor, Councillor G. Scoble.

The Undertaking was first formed as the Devonport Gas Company by a body of local gentlemen in 1844, with a capital of £15,000 subscribed by 204 shareholders, and duly authorized by Parliament in 1853, with statutory limits of supply confined to the Parish of Devonport. In 1902, the Company was purchased by the Devonport Corporation at a cost of £153,271, and in 1914 was taken over, by amalgamation, by Plymouth Corporation. The statutory limits of supply are exactly the same as in 1902, and are only 3,356 acres, or 5·24 square miles.

—	Gas Made, Cu.Ft.	Coal Carbonized, Tons.	Price of Gas per 1,000 Cu.Ft.	Number of Consumers.	Miles of Mains.
	Million.		s. d.		
1902.. ..	268	30,163	2 6	7,962	50
1914.. ..	487	29,148	2 4	20,153	55
1924.. ..	735	31,260	2 11	22,506	71
1934.. ..	875	46,590	2 11	27,088	94
1939.. ..	931	59,842	2 6	28,244	109

During the morning the members inspected the Gas-Works at Keyham, the principal features of which were so ably described by Mr. Blackburn in his Presidential Address (G.J., March 29, p. 871). The excellent lay-out of the works and the efficiency of the plant were greatly admired, it being particularly noted how the best possible use has been made of the comparatively small available space. Special interest was taken in the air-raid shelters for the gas-works' personnel which have been constructed from two old Lancashire steam boilers which have ceased as such to be of use for steam raising. The fire-tubes have been cut out and all flues filled with mass concrete. Retaining walls have been built up and the tops of the boilers covered with reinforced concrete. Temporary shelter is thus afforded for some fifty men, and everything possible has been done for their comfort should it be necessary for them to take refuge in time of war.

CIVIC LUNCHEON.

At a civic luncheon the delegates were welcomed by the LORD MAYOR. Proposing "The Southern Association and the Guests," the Lord Mayor congratulated the Association on having elected Mr. Blackburn as their President, and declared that he was one of the Council's senior and most respected officers. After a reference to the healthy rivalry between gas and electricity, Mr. Scoble said that Plymouth was extremely proud of its Gas Undertaking, which had lost none of its effectiveness by municipal control. The Undertaking bore favourable comparison with the private company gas-works in the city, and the rivalry had proved a healthy stimulus to both bodies. Under the guidance of Mr. Blackburn the Corporation had a gas-works which could be held up as a model for the South of England of the way in which such works should be run, while the name of Tozer would also always be associated with gas in Plymouth. It was due to the foresight of the present Chairman's father that the old Devonport Corporation acquired the Undertaking.

The PRESIDENT, responding, thanked the Lord Mayor for his kind welcome, and the Corporation for making it possible for the Association to hold their summer meeting in Plymouth. Mr. Blackburn expressed regret that Mr. R. Robertson, President of The Institution of Gas Engineers, had been unable to attend through having been called to London on business connected with the Industry.

Sincere appreciation of the opportunity of visiting Plymouth was expressed by Mr. G. LE B. DIAMOND, Vice-President of the Association, in submitting "the City of Plymouth and the Gas Department." He said that delegates had enjoyed their visit to the Corporation's fine works, where they had been impressed by the extreme tidiness and the great care with which details were looked after. They were also impressed by the very fine type of man employed. They were magnificent men, and fulfilled entirely their view of what gas-works' men should be.

Mr. Diamond also congratulated the Corporation upon the low figure at which it sold gas, and declared that the citizens had cause to be proud of the service which the Undertaking rendered. They also paid tribute to the Committee as well as Mr. Blackburn for the fine management which had achieved such results.

Thanks to the Association for the manner in which it had eulogized the Undertaking were expressed by Alderman J. CLIFFORD TOZER, Chairman of the Gas Committee, in reply. He thanked the proposer for his praise of Mr. Blackburn, and pointed out that during the time their President had been Engineer and Manager the Department had made considerable progress. The works which they had visited that morning had a very interesting history. When the Undertaking was established 95 years ago as a private Company it was a very small concern, with capital of £15,000 and 204 shareholders. It was purchased by Devonport Corporation 37 years ago for £153,000. At that time the output had increased to 268 million cu.ft., and there were 7,962 consumers. On amalgamation of the Three Towns 25 years ago the Undertaking was taken over by the Plymouth Corporation, and under that authority had increased its output to 489 million cu.ft. and had 20,153 consumers. After a quarter of a century's control by Plymouth Corporation, the Undertaking was in the proud position of having an output of over 935 million cu.ft. and supplying 28,244 satisfied consumers.

The speaker suggested that the extraordinary increase was all the more creditable when it was realized that the area for which the Undertaking was responsible was no larger to-day than it was 25 years ago. That area was equivalent to 3,356 acres, or approximately 5¼ square miles. Last year a record output in the history of the undertaking was achieved, when there was an increase of 32 million cu.ft. over the previous year. Already this year they were adding to that large increase.

Mr. Tozer stated that it was at Mr. Blackburn's instigation that the benzole manufacturing plant was installed. The plant had produced over a million gallons of crude benzole, and last year the Corporation sold 150,000 gallons of benzole. The turnover of the Undertaking exceeded £200,000, and it was of interest to note that the capital charges represented only 14½% of that amount. "It has already been mentioned that we are in the fortunate position of being able to supply gas at one of the lowest figures in the country. I think you will agree that 2s. 6d. per 1,000 cu.ft. is all to the credit of the Undertaking, bearing in mind the distance we are from the coalfields," he said. "This year, in spite of the considerable increase in the price of coal, we are fortunately in a position to maintain that price, and have every reason to believe we shall be able to do so for the remainder of the year. Provided there is not a further increase in the price of coal in the coming years we have reason to feel confident we shall be able to reduce our product to a figure which I think will be the lowest in the country."

Mr. Tozer spoke of the friendly rivalry between the electricity and gas undertakings, and said that when the Electricity Department instituted a system of hire-purchase for electric cookers with the slogan, "Less than a penny a day," the Gas Department retaliated with a long-term hire-purchase system and the slogan, "Yours for 6d. a week." Since the introduction of that scheme they had sold 10,386 all-enamel cookers, compared with 1,800 in the four years prior to the introduction of the scheme.

So far as Mr. Blackburn was concerned, Mr. Tozer congratulated the Association on its choice of President, and stated that the Corporation was looking forward, under their Engineer's guidance, to the Undertaking making new records which would be to the credit of the Gas Industry.

A Cruise of the Docks.

After luncheon members and their ladies adjourned to Millbay Docks where they embarked in a Great Western steamer for a most interesting cruise of the docks. Many naval craft were to be seen and the close-up view which was obtained of several aircraft carriers was the first which many of the members had had. Tea was provided for the visitors in the greatest comfort and all were sorry when the time came to return to the docks and disembark after a most happy day spent in the full enjoyment of the well-known West Country hospitality dispensed by charming hosts.

THE FIRST REPORT
OF THE

Abstract of I.G.E. Communication No. 202

Arthur Duckham Research Fellowship

Combustion Properties of Gases

by

A. E. HAFFNER, Ph.D., A.R.C.S.

(Arthur Duckham Research Fellow).

SUMMARY

Increasing attention is being paid to the combustion characteristics of town gas, and the Gas Industry would benefit if a clear definition and measure of such characteristics could be established.

The influences of calorific value and specific gravity are considerable in determining the behaviour of gases in appliances, but other factors require to be taken into account. Foremost amongst these factors is the ignition velocity which determines the stability of aerated flames in respect of lighting back and lifting off the burner, and the size of inner cones which influences carbon monoxide survival in the products of combustion and also the intensity of combustion. In view of the difficulties of comparing ignition velocities, test burners which give a composite indication of the effects of ignition velocity and specific gravity upon the cone forming properties of gases have found acceptance. The relationship between test burner numbers and the more fundamental properties of specific gravity, ignition velocity and the air injection of the burner can be satisfactorily analysed.

The main properties of 20 synthetic mixtures which represent almost all types of gas which are likely to be distributed as British town gas have been determined.

Dilution of coal gas causes test burner numbers to fall. Benzole removal causes the test burner numbers to rise for the same calorific value of the mixture. Dehydration is considered to have an inappreciable effect. The greatest change in test burner value is caused by the admixture of carburetted water gas which is related to the problem of peak loads and coke salability. Nevertheless, the widest difference that could be expected through this factor should remain within the toleration limits of most appliances, particularly if it is possible to adjust them on gas representative of the mean between the two extreme conditions. The results have been used to test the American Gas Association's "C Factor" which appears to have no appreciable advantage over test burner numbers, and also Minchin's "Function D" which is based upon a logical use of ignition curves.

A Section is concerned with observations upon several of the gas mixtures studied when burnt in typical appliances.

The investigation upon a portable gas fire burner was concerned with the effect of supplying gases of various test burner value upon the flame shapes at several adjustments of the burner. Test burner numbers gave a reasonable indication of the size of the inner cones of the various flames produced.

The work upon unaerated burners as used in water heaters was carried out in order to discover how far the factors influencing inner cone formation in aerated burners influenced the flame shapes of unaerated burners. No connexion could be established but it is clear that bunsen flames are much more sensitive to change in gas value than are unaerated flames. The influence of specific gravity upon rate of heat supplies remains and at high specific gravities the rate of heat supply may be inadequate and at low specific gravities certain appliances may not have sufficient air available for combustion.

The experiments with the boiling burner were devoted to a study of the relationship between burner efficiency and combustion density. There was some indication that the air-gas mixture which gave the maximum efficiency had also the greatest combustion density. A minimum separation of the pan from the burner head is required in order to take full advantage of this, but the hazard of carbon monoxide survival would make such an arrangement unduly sensitive to changes in combustion characteristics.

INVESTIGATION OF THE COMBUSTION PROPERTIES OF TYPICAL TOWN GASES

Gas Mixtures Employed

The search for a satisfactory criterion of combustion quality is simplified if the criterion is meant to cover only the commercial mixtures that may be sold as town gas. Gas mixtures were therefore made from the ordinary gases commercially available in cylinders so as to have compositions likely to be met in practice, and the range of gases actually covers 95 per cent. of the gas sold under British conditions. Unsaturated hydrocarbons were represented by ethylene, enriched with benzene vapour, and saturated hydrocarbons were taken to be simply methane. As guidance for gas compositions usually met, the analyses quoted in "Technical Data on Fuel" (World Power Conference, 1928) were used. These gas compositions are similar to those quoted for German gases in H. Brückner's "Gastafeln" (1937, p. 91, Verlag Oldenburg). The gases were mixed in a 100 cu.ft. water-sealed gasholder, benzene vapour was added by blowing hydrogen through a sintered glass bubbler containing a measured volume of benzene and the correctness of this addition was checked by analysis before the addition of ethylene. After allowing a suitable interval for the gases to mix and to attain equilibrium with the sealing water, an analysis was made and adjustments effected if necessary before proceeding to determine the combustion properties.

Table 1.—*Types of Gas Mixtures Used*

—	Basic Gas.	Percentage of Added Gas in Mixture.	Added Gas.	Calorific Value of Mixture, B.Th.U. per Cu.ft.	Specific Gravity of the Mixture.
1	2	3	4	5	6
1	Coal gas	—	—	565	0·41
2	Coal gas	24	Blue water gas ..	500	0·44
3	Coal gas	42	Blue water gas ..	450	0·46
4	Blue water gas ..	—	—	295	0·55
5	Debenzolized coal gas	—	—	535	0·38
6	Debenzolized coal gas	14	Blue water gas ..	500	0·42
7	Debenzolized coal gas	34	Blue water gas ..	450	0·45
8	Coal gas	15	Producer gas ..	500	0·47
9	Coal gas	26	Producer gas ..	450	0·53
10	Producer gas ..	—	—	126	0·90
11	Debenzolized coal gas	9	Producer gas ..	500	0·43
12	Debenzolized coal gas	21	Producer gas ..	450	0·49
13	Coal gas	11·5	Waste gas ..	500	0·49
14	Carburetted water gas	—	—	500	0·62
15	Carburetted water gas	—	—	450	0·61
16	Coal gas, 54 per cent.	—	Carburetted water gas (422 B.Th.U.), 46 per cent. ..	500	0·49
17	Coal gas, 38 per cent.	—	Carburetted water gas (461 B.Th.U.), 2 per cent. ..	500	0·52
18	Debenzolized coal gas 41 per cent. ..	—	Carburetted water gas (470 B.Th.U.), 59 per cent. ..	500	0·51
19	Debenzolized coal gas 52 per cent.	—	Carburetted water gas (464 B.Th.U.), 48 per cent. ..	500	0·49
20	Town gas ..	—	—	436	0·45

Gas Properties Measured

The properties necessary to provide a basis for the assessment of the combustion properties were considered to be the following:

(i) Gas composition. Gases were analysed on the Gasinstitut modification of the Orsat apparatus. From the gas analyses were calculated the air requirements

as well as the products of combustion for theoretical combustion.

(ii) Calorific value determined on a Junkers calorimeter.

(iii) Specific gravity by comparison with air in the Bunsen-Schilling apparatus.

(iv) Ott values for flicker point (F.Z.) and lighting back point (R.Z.).

(v) Prüfbrenner Number (P.B.Z.).

(vi) Aeration Test Burner Number (A.T.B.) (Instrument Number 107).

(vii) Ignition velocity—gas composition curves as determined by the dynamic method.[15]

Furthermore, the behaviour of the gases was investigated in the following appliances which represent typical methods of gas utilization:

(*a*) A Bunsen burner of fixed air opening and fixed gas nipple.

(*b*) A portable gas fire, *i.e.*, an appliance operating at high temperatures.

(*c*) Burners from a water heater, *i.e.*, an appliance using unaerated flames.

(*d*) A boiling burner, *i.e.*, an appliance where the flames are cooled.

The data collected serve to calculate the criteria that have already been suggested by others, and are also available in the search for other relationships between gas composition and combustion quality.

Although in respect of calorific value and type of gas mixture the gases studied cover a wide range of manufacturing conditions, all the gas mixtures containing coal gas are based upon one particular coal gas. It is known that coal of dissimilar origin produces different kinds of coal gas and the same coal in different carbonizing systems yields gases of different composition owing to variations in cracking conditions. This is indicated by the diversity of Hydrocarbon Enrichment Values found for different coals and carbonizing conditions, and variations may occur in which the Hydrocarbon Enrichment Value differs by 15 per cent. for the same coal. The experiments carried out did not cover such differences in the basic coal gas. The gas mixtures studied have substantially similar properties to those mentioned in the literature, *e.g.*,

Coal gas may be diluted to lower calorific value according to the following table:

TABLE 2.—*Dilution of Coal Gas*

	Percentage of Diluent Gas in the Mixture when Basic Gas is:	
	Coal Gas.	Debenzolized Coal Gas.
1	2	3
To make 500 B.Th.U. gas:		
Blue water gas	24	14
Producer gas	15	9
Waste gas	11·5	6·5
To make 450 B.Th.U. gas:		
Blue water gas	42	34
Producer gas	26	21
Waste gas	20·3	15·8

Apart from the methods of gas making depending upon the dilution of coal gas, blue water gas can be enriched to any degree up to the declared calorific value by carburetting with gas oil. It is not sufficient in considering combustion qualities to deal with the average proportion of C.W.G. that may be in the town gas, but with the maximum proportion which may be delivered, however short the time.

[All the properties measured or calculated have been recorded for the 20 gases examined.]

Blue Water Gas Addition

The effect of addition of B.W.G. (specific gravity 0·55) to coal gas (0·41) and debenzolized coal gas (0·39) is to cause a marked increase in specific gravity. The ignition velocity curves are elevated, broadened and displaced in the direction of increased gas. In Figure 1 the effects of B.W.G. addition upon maximum ignition velocity, percentaged diluent gas, cone height of the Bunsen burner and A.T.B. values are indicated.

The effect of B.W.G. dilution upon test burner number is more obvious between 565 B.Th.U. and 470 B.Th.U. than afterwards when the fall in test burner number is more gentle. The Bunsen cone height appears to be almost a linear function of calorific value, falling from 16·5 cm. for coal gas to 4·0 cm. and 3·0 cm. for 450 B.Th.U. mixtures of coal gas and debenzolized coal gas respectively.

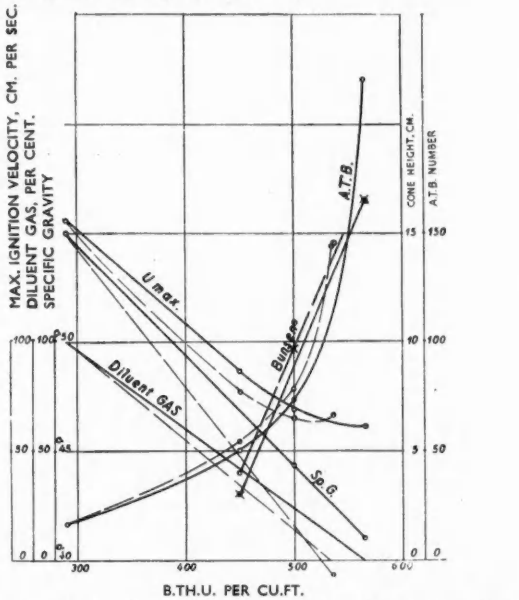


FIGURE 1.—*Properties of Mixtures of Blue Water Gas, Coal Gas and Debenzolized Coal Gas.*

Removal of benzole from the coal gas causes the calorific value of the latter to fall about 30 B.Th.U. and less B.W.G. can be added in reducing the calorific value to a given level. The effect upon the Bunsen and test burners of benzole extraction is very small, causing about 10 per cent. increase in the latter, when comparing mixtures at the same calorific value. The ignition velocity curves are affected only in the region of maximum ignition velocity and in the range of usual gas-air mixtures the curves are almost coincident. The differences in the test burners and Bunsen burners are therefore entirely due to the specific gravity fall in this particular instance.

Producer Gas Addition

For the attainment of a given calorific value the amount of producer gas that can be added is about 60 per cent. of the B.W.G. Instead of an elevation of the ignition velocity, a fall occurs which is associated with the low ignition velocity of producer gas (Figure 2). The specific gravity of the coal

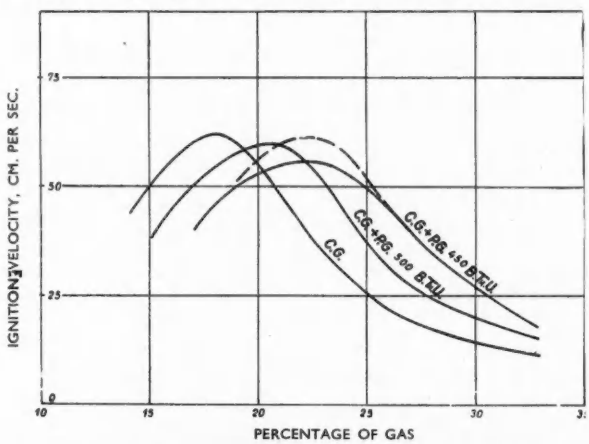


FIGURE 2.—*Ignition Velocities of Producer Gas Mixtures of Coal Gas and Debenzolized Coal Gas.*

gas-producer gas mixture at 500 B.Th.U. is 0·49 (*cf.* the B.W.G. mixture −0·44) and at 450 B.Th.U. is 0·54 (*cf.* the B.W.G. mixture −0·47), and as the calorific value sinks lower the specific gravity differences become increasingly marked The branches of the ignition velocity curves in the region of usual air-gas mixtures are steeper for B.W.G. than for producer gas mixtures and this feature becomes more pronounced with decreasing calorific value.

These two factors, specific gravity and ignition velocities, operate in opposite directions in this case in their effects upon aerated burners. The increased specific gravity of the producer gas mixture causes the proportion of gas in the burner mixture to decrease and there is a corresponding increase in the ignition velocity.

Benzole extraction, when producer gas addition is practised, is rather more marked in its effect upon the behaviour of burners than with coal gas B.W.G. mixtures.

TABLE 3.—*Effects of Benzole Extraction*

—	At 500 B.Th.U.		At 450 B.Th.U.	
	With Benzole.	Without Benzole.	With Benzole.	Without Benzole.
1	2	3	4	5
Specific gravity	0·48	0·44	0·54	0·49
A.T.B. units	79	87	57	62
Bunsen cone height, cm.	10·7	12·4	3·9	6·6

The difference in the ignition velocity curves for the producer gas mixtures is imperceptible at 500 B.Th.U. but at 450 B.Th.U. the ignition velocity curve is elevated following benzole extraction. This is due to the smaller amount of slow burning producer gas that can be added in diluting to a given calorific value.

Waste Gas Addition

Apart from the somewhat higher CO_2 and smaller CO contents, 500 B.Th.U. gas made by the addition of 11·5 per cent. waste gas to coal gas is scarcely to be distinguished from the coal gas-producer gas mixture of the same calorific value. The specific gravity is slightly higher and the test burner numbers are somewhat higher (1 to 3 units), whilst the maximum ignition velocity is changed from 60·5 cm. per sec. at 20·5 per cent. gas to 53·0 cm. per sec. at 21 per cent. gas.

Carburetted Water Gas

The specific gravity of the 500 B.Th.U. carburetted water gas is high at 0·62 but at the lower calorific values the specific gravity falls, for example, to 0·55 in the case of B.W.G. (Figure 3). Such high specific gravities are not met in other

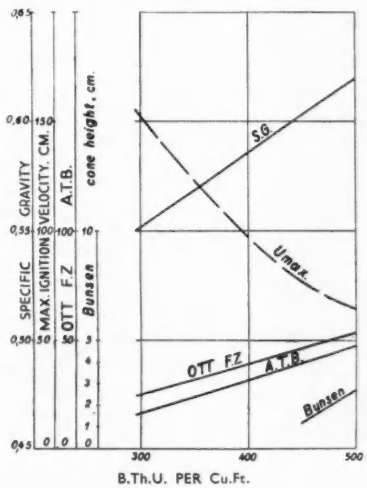


FIGURE 3.—*Properties of Carburetted Water Gas of Various Calorific Values.*

methods of producing town gas. The A.T.B. Number is 49 units per 500 B.Th.U. carburetted water gas and is 39 for 450 B.Th.U. carburetted water gas and 25 for B.W.G.

Mixtures of Coal Gas (with and without benzole) and Carburetted Water Gas

The practice of mixing varying amounts of carburetted water gas with a basic coal gas makes an investigation of the combustion properties of such mixtures of special interest. With this in view, coal gas and B.W.G. (500 B.Th.U.) were mixed with C.W.G. (500 B.Th.U.) in various proportions. Such mixtures may also be regarded as mixtures of straight coal gas and C.W.G. of lower calorific value than 500 B.Th.U. and on this basis the data are plotted in Figure 4. Corre-

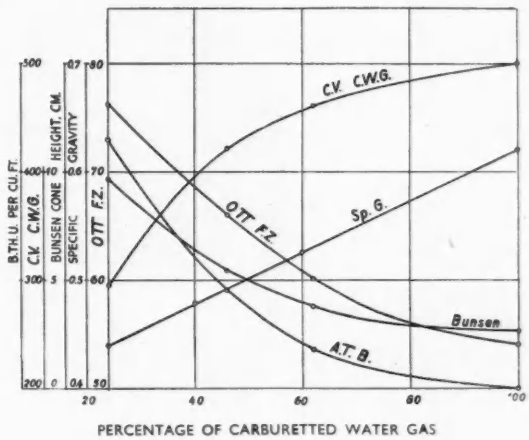


FIGURE 4.—*Properties of Mixtures of Coal Gas and Carburetted Water Gas.*

sponding results with debenzolized coal gas as the basic constituent are presented in Figure 5. From these curves can be seen the combustion properties of mixtures between that with only B.W.G. as diluent and that of C.W.G. alone. This admittedly goes beyond the stage at which complete gasification has been reached, and all the coke yielded by the carbonizing plant has been gasified in the C.W.G. plant. (This

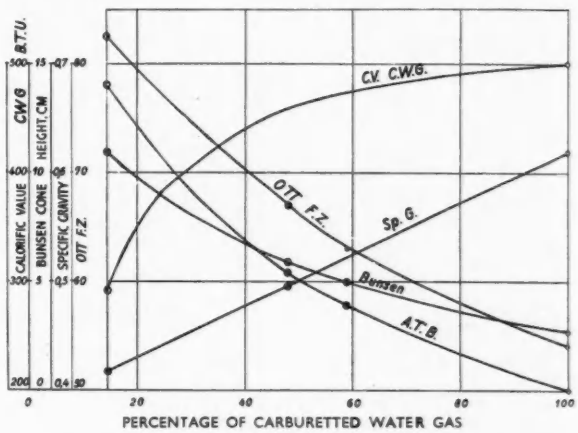


FIGURE 5.—*Properties of Debenzolized Coal Gas and Carburetted Water Gas.*

corresponds to about 66 per cent. C.W.G. in the mixture.) The circumstance is not excluded that the Works can at a given time be delivering a gas containing more C.W.G. than corresponds with complete gasification in the event of emergency supplies to meet unexpected peak loads or other contingencies. By the nature of such an occasion many appliances are likely to be in use and the trouble due to a drastic change in combustion properties can be widespread. The change in combustion properties as more C.W.G. is added is not linear, and there is a greater rate of change in the

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region up to 50 per cent. C.W.G. than afterwards. The change is shown in Table 4.

TABLE 4.—*Changes in Combustion Properties*

—	D.C.G. + B.W.G.	Coal Gas + B.W.G.	Coal Gas + C.W.G. (Complete Gasification). (66 Per Cent. C.W.G.).	C.W.G.
1	2	3	4	5
Specific gravity	0·41	0·44	0·54	0·62
Ott (F.Z.)	82	76	59	54
Prüfbrenner (P.B.Z.) ..	91	82	64	59
A.T.B. units	78	73	53	49
Bunsen cone height, cm.	10·8	9·6	3·4	2·7

The specific gravity range would be still wider if the basic coal gas were lighter through a higher degree of cracking and if the C.W.G. were heavier due to a higher inert gas content and therefore a higher oil gas content.

The two curves in Figures 4 and 5 indicate the properties of 500 B.Th.U. mixtures of C.W.G. and coal gas and debenzolized coal gas respectively.

INFLUENCE OF MANUFACTURING CONDITIONS

The foregoing results provide a basis for the consideration of the influence of manufacturing conditions upon the combustion properties of the town gas produced. The A.T.B. Numbers of various mixtures are recorded.

TABLE 5.—*Aeration Test Burner Numbers*

Type of Gas.	Calorific Value, B.Th.U. per Cu.Ft.				
	525	500	475	450	425
1	2	3	4	5	6
Coal gas + blue water gas ..	96	73	60	50	43
Debenzolized coal gas + blue water gas	111	78	65	54	47
Coal gas + producer gas ..	104	79	68	57	50
Debenzolized coal gas + producer gas	114	87	74	62	55
Carburetted water gas	51	49	44	39	36

For a given basis coal gas the combustion properties of the town gas depend upon:

(i) Diluent gas added to the coal gas. Producer gas mixtures are about 7 A.T.B. units higher than B.W.G. mixtures.

(ii) Proportion of admixed C.W.G. In extreme circumstances the A.T.B. Number can change from 114 (525 B.Th.U. mixture of debenzolized coal gas and producer gas) to 51 (C.W.G. alone). The difference decreases at lower calorific values.

(iii) Degree of benzole removal. Extraction of 3 gal. of benzole per ton of coal causes an increase of about 6 A.T.B. units. The effect is more marked at higher calorific values and greater for producer gas mixtures than for water gas mixtures.

The effect of gas dehydration can be neglected since the specific gravity is only slightly reduced and the influence of partial dehydration upon ignition velocity can be anticipated to be very small. This view has been confirmed by W. F. Thorne and W. S. Stredwick.

The diluent gas to be added is selected according to a policy dictated by local circumstances of available plant and market conditions. Vertical retort installations conveniently produce the required B.W.G. by steaming, but horizontal retort gas is frequently diluted by producer gas. F. O. Hawes has pointed out the advantages of producer gas dilution, including the circumstances that appliances adjusted on high A.T.B. Number gas (producer gas mixtures) have a greater tolerance to "hardening" of the gas. Although the German standard for town gas recommends dilution with water gas, many German Works are now practising admixture of producer gas (from coke or brown coal) or even waste gas on account of prevailing coke prices.

Benzole removal is favoured by fiscal encouragement. At times of peak load benzole extraction may be temporarily stopped. For these two causes small variations in test burner numbers can be expected.

By far the greatest change of combustion characteristics follow change in the proportion of C.W.G. This is associated with a common method of varying the gas output to cover winter gas requirements or unexpected demands which cannot be covered by holder stocks. At periods of low salability of coke, an increased proportion of C.W.G. provides an outlet for surplus coke and assists in stabilizing prices. Such market conditions change relatively slowly, but can conceivably occur within a period when gas appliances set for the earlier conditions are supplied at a later stage with gas for which they are unsuitably adjusted.

In connexion with a lecture which he delivered before The Institution of Gas Engineers in June, 1935, A. G. Glasgow used a chart to illustrate the tactical use of C.W.G. as a coal gas auxiliary. The coal gas is not defined and it is not indicated whether it is debenzolized or whether it includes any B.W.G. made in vertical retorts. Assuming that such B.W.G. is included and taking values from Figures 4 and 5, it is found that on the day of minimum output and lowest proportion of C.W.G., the A.T.B. Number is 66, and on the day of maximum output and highest proportion of C.W.G. the A.T.B. Number is 55—a fall of 11 units. If benzole is fully extracted these Numbers become 69 and 60 respectively. If, as may be the case, there is full benzole extraction at times of low demand and the benzole plant is shut down at the maximum output period, the change in A.T.B. Number can be from 69 to 55—a fall of 14 units. This would appear to be within the toleration limits of all but very sensitive appliances, particularly if adjusted initially at a mean value.

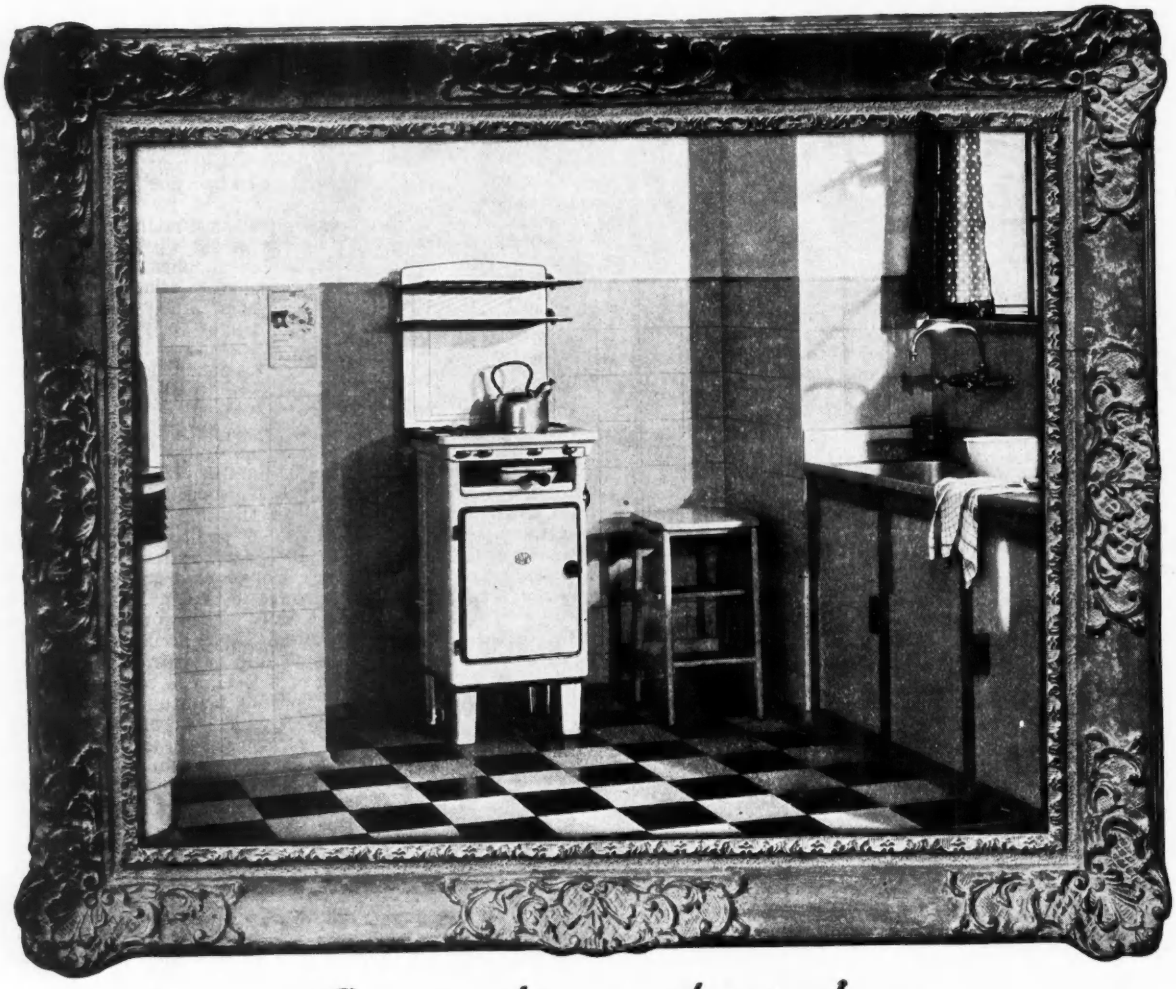
An alternative to the use of C.W.G. as a coal gas auxiliary is the system of having carbonizing plant under slow fires in expectation of increased gas demand. An aid to plant flexibility is the utilization of surplus gas at times of low gas demand to heat the settings or even to raise steam, and this policy has been observed in many German Gas Works even when the coal/coke price ratio is not exceptionally favourable. In this connexion it should be noted that oil for carburetting purposes is not readily available in Germany and the Author is unaware of any German Gas Works making C.W.G. under present conditions. Finlayson has suggested that peak loads could be covered by increasing the throughput (and calorific value of the gas) of vertical retorts and making the necessary B.W.G. in an external plant instead of within the retorts.

W. F. Thorne and W. S. Stredwick have established for their local requirements the conditions necessary to keep the A.T.B. value of the district gas within narrow limits. The calorific value of the coal gas is decreased by extra pulling or waste gas addition to compensate for the increase in C.W.G. proportions.

An alternative and promising scheme for compensating for the adverse effects upon test burner numbers of changes in the proportion of C.W.G. in town gas consists of modifying the composition of peak load water gas. The specific gravity can be decreased by admixture of hydrogen or by partial replacement of carbon monoxide by hydrogen. Established industrial methods for producing synthesis gas are available, *e.g.*, catalytic conversion of carbon monoxide or drastic cracking of hydrocarbons in the fuel bed of water gas generators. Success has been obtained already in back-run gas oil cracking in certain American C.W.G. plants and by this process it is possible to make modified C.W.G. of calorific value 500 B.Th.U. with a specific gravity of less than 0·55.

Little work appears to have been published upon the modification of ignition velocities of gases by addition of small quantities of other gases or vapours to act as accelerators or retarders in order to compensate for changes in town gas composition. H. Hartley refers to an increase of 28 A.T.B. units by the addition of about 1½ per cent. butane, with a corresponding increase in calorific value. It is interesting to note that a continental Gas Works (private communication) is considering a scheme for the emergency "softening" of town gas of temporarily large C.W.G. proportion by the vaporization of petrol.

A.D. 1939



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EXPERIMENTS ON APPLIANCES

Preliminary Considerations

In the interests of retaining any essential flexibility in gas manufacture, appliances should be designed with a maximum degree of tolerance consistent with efficient working.

After examining many British Appliances in widespread use, L. T. Minchin concluded that appliances could tolerate a variation of ±10 A.T.B. units (65 to 85) if the appliances are non-adjustable and initially designed to work on the mean figure (75). Before gas cooker and hot plate burners fulfil the requirements of the German specification Normblatt (DIN—DVGW 3230 Beuth—Verlag, 1934) they must not light back at normal gas rate or at simmering rate when the Normgas (440 B.Th.U. per cu.ft.) is reduced in calorific value to 410 B.Th.U. by the addition of B.W.G. Actually, many of the burners tested at the Gasinstitut, Karlsruhe, could be supplied with gas of 370 B.Th.U. and in rarer cases with water gas alone without lighting back. The A.T.B. Numbers at 440, 410, 370 and 295 B.Th.U. are approximately 47, 40, 31 and 18 units respectively for the gases under consideration. It is therefore interesting to note that cooker and hotplate burners are required to accommodate 7 units fall (at an A.T.B. value of 47), but some can tolerate a reduction of 29 units.

General conditions for appliance testing in Holland require that an appliance adjusted on a standard gas of Prüfbrenner Number 65 should, without any alteration, accommodate gas of Prüfbrenner Numbers 70 and 57 without lighting back or producing a CO/CO_2 ratio in the products of combustion greater than 0·005.

The appliance testing laboratory of the Société du Gaz de Paris, and also the testing centre of the Swiss Gas and Water Association, have experimented upon the tendency of burners to light back, and have recommended certain values and dimension ratios of nipple, injector, and burner head. A design has been evolved which avoids the continuation of burning of the gas at the nipple when the igniting flame is removed and will cause the flame to move forward to the burner head. Their objects appear to have been to obviate carbon monoxide production in a burner accidentally lit back at the air port by some outside source of flame. This is not clearly related to lighting back due to a change in combustion quality of the gas supplied.

One of the ways in which appliances can be designed to minimize the possibilities of lighting back or of excessive elongation of the cones is already incorporated in those appliances which are equipped with multi-flame burner heads, instead of single cone burners.

Attention has been given to the question of flame stability in Bunsen flames, but large quantities of appliances incorporate unaerated burners, which appear to possess greater degrees of tolerance of change in combustion characteristics.

Experiments on Selected Appliances

In order to extend the data already discussed it was arranged to observe the behaviour of some of the gases when burnt in appliances which could be regarded as typical of those in widespread use. The sizes of the cones when the gases were burnt were measured for all the gases. In addition, observations were made of the stability of the flames when the gases were burnt in a portable radiant fire burner which was selected to typify gas utilization at high temperatures. The burners of a water heater which depended on unaerated flames were used to make a brief survey of the variation in dimensions of the flames when supplied at constant pressure with the different gases. The experiments with the boiling burner, which is an example of a low-temperature utilization of gas, were not carried out in a way which permitted a correlation of behaviour with test burner numbers, but were concerned with a consideration of the relationship between burner efficiency and combustion intensity.

Experiments with a Portable Fire

The portable radiant fire tested is representative of a popular type of British gas appliance, and for this reason it was selected for the examination in it of the behaviour of the series of gases. Usually it is disposed with the radiant in a sloping position, but for experimental purposes it was arranged vertically, as shown in Figure 6. Gas was introduced at *a*, at a pressure recorded at the water gauge at *b*, and passed through the pressure regulator *2* which, however, was used full open and pressure regulations were made more conveniently at the inlet. The adjustment *3* of the nipple *4* was fitted with a pointer and a graduated scale in order to facilitate the reproduction of definite settings. Air injected at the fixed air opening *5* mixed with the gas stream in the tube *6* and the mixed stream issued from the fireclay burner head *7* which was perforated with seven inner ports 0·27 mm. in diameter and twelve outer holes of 0·28 mm. diameter (total area 1·14 sq.cm.). For observing the cone heights by means of the cathetometer *9*, the fireclay radiant *8* was removed. Samples of the gas-air stream could be collected through the side tube *10*.

Preliminary investigations showed that:

(i) For a given pressure the gas rate was a maximum at setting 240° and a minimum at 60°.

(ii) On testing with a gas of specific gravity 0·455, the air-gas ratio was almost inversely proportional to the gas rate, in respect of changes brought about by the adjustment of the nipple. At setting 180° the gas was 23·5 per cent.; at 135°, 17 per cent.; and at 90° the gas was 10·6 per cent. Since these mixtures are unusable at the lower settings owing to lighting back, these determinations were made with the unlighted burner but with the radiant in position.

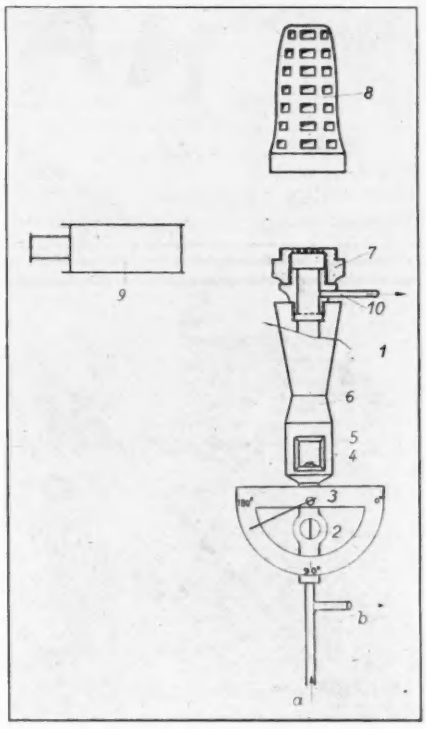

FIGURE 6.—*Portable Fire Burner.*

(iii) Most gases could be used and a favourable setting found between the settings 135° and 195°, adjusting to the correct gas rate by a change in inlet pressure.

(iv) For a given setting the air-gas ratio was proportional to the square root of the specific gravity over the specific gravity range 0·35 to 0·9.

(v) Cones could not be adjusted below 0·15 to 0·17 cm. without backfiring occurring and at about a cone height of 0·7 cm. the individual cones tended to form one united cone.

Observations were made at many pressures and settings but it is simpler to confine attention to comparisons at a

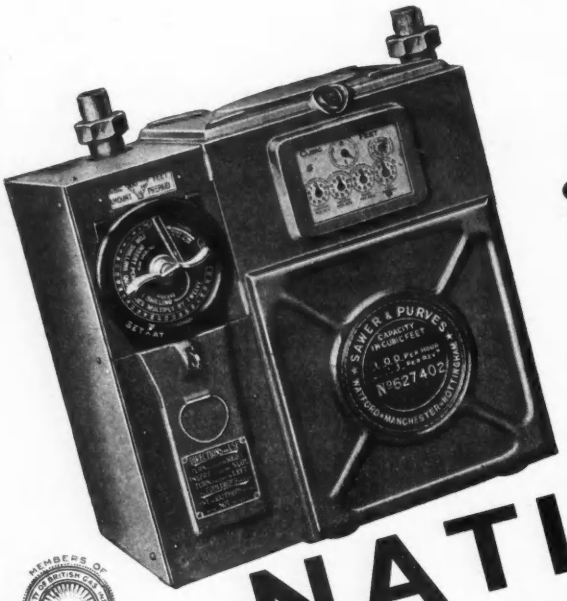

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TABLE 6.—*Observations Upon the Portable Gas Fire Burner*

Gas.					Burner Adjustment (all at 100 Mm. Pressure).								
					180°.			165°.			150		
No.	Description.	Calorific Value, B.Th.U. per Cu.Ft.	Ott No.	A.T.B. No.	Mean Inner Cone Height, Cm.	Flame Height, Cm.	Gas Rate, L. per Hr.	Mean Inner Cone Height, Cm.	Flame Height, Cm.	Gas Rate, L. per Hr.	Mean Inner Cone Height, Cm.	Flame Height Cm.	Gas Rate, L. per Hr.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	C.G.		125	220	6·5	17	215	4·5	13·5	185	1·0	11·5	143
2	C.G. + B.W.G. ..	500	76	73	2·7	14·5	209	0·9	14·0	179	0·23	11·6	138
3	C.G. + B.W.G. ..	450	58	50	0·30	16·5	217	0·22	12·0	187	*	*	—
4	B.W.G. ..	295	25	16	*	*	—	*	*	—	*	*	—
6	D.C.G. + B.W.G. ..	500	82	78	2·2	17·5	225	1·1	13·2	193	0·13	10·5	144
7	D.C.G. + B.W.G. ..	450	63	54	0·31	12·8	205	0·21	12·0	178	*	*	—
8	C.G. + P.G.	500	80	79	1·6	12·5	194	0·78	11·5	169	0·26	10·0	130
9	C.G. + P.G.	450	65	57	0·4	14·7	193	0·28	10·5	165	0·18	7·0	129
10	P.G.	126	18	12	*	*	—	*	*	—	*	*	—
12	D.C.G. + P.G. ..	450	70	62	0·85	12·5	200	0·37	11·0	176	0·23	8·5	131
14	C.W.G.	500	54	49	0·29	14·0	176	0·21	11·8	153	*	*	113
15	C.W.G.	450	47	39	*	*	—	*	*	—	*	*	—
16	C.G. + C.W.G. ..	500	66	59	0·32	16	198	0·30	13·0	172	—	—	—
17	C.G. + C.W.G. ..	500	60	53	0·30	15·5	192	0·22	13·5	165	*	*	—
20	Town Gas+	440	60	59	0·44	15·5	212	0·38	15·0	187	0·22	13·5	154

* Lighting back occurred.

standard pressure of 100 mm. and three settings of 180°, 165° and 150°. For each of these settings the cone height, the flame length and the gas rate are recorded (Table 6).

It was found that whereas coal gas at setting 180° gave a cone height of 6·5 cm., coal gas + B.W.G. of 500 B.Th.U. had a cone height of 2·7 cm., and all other 500 B.Th.U. gases were similar except C.W.G. with a cone height of 0·29 cm. The 450 B.Th.U. mixtures gave much lower cone heights at about 0·30 cm. with the exception of C.W.G. of 450 B.Th.U. which was unusable at all settings. The distinctions in the gases became more marked at lower settings.

At setting 150° coal gas had a cone height of 1·0 cm.; the 500 B.Th.U. mixtures had a cone height of about 0·22 except C.W.G., which lit back; the 450 B.Th.U. mixtures had all lit back except those containing producer gas.

This diverse behaviour of the gases in the burner is predictable from the Ott Number (or any other test burner number). At the 180° and 165° settings gases below an Ott Number (FZ) of 50 units are unusable, and if the setting is 150° gases with an Ott value below 65 units will backfire.

A suitable flame had an inner cone height of 0·35 cm. and this could be attained for 65 Ott units of gas at an adjustment of 180°, for 70 Ott units of gas at 165°, and for 97 Ott units of gas at 150°. With these settings (cone height, 0·2 cm.) lighting back is imminent with gas of 52, 58 and 70 Ott units respectively. A tendency for the small inner cones to unite occurs with gas of 69, 74 and 110 units respectively.

Using these limits, an appliance suitably adjusted for gas of 63 Ott units can tolerate a change of −11 and + 7 Ott units. The tolerance, −23 and + 25, as measured by Ott Number change, is greater if the appliance is adjusted for gas of 93 Ott units.

TABLE 7.—*Ott Numbers Corresponding to Cone Height*

——	Ott Values		
Cone Height, Cm.	0·2	0·35	0·7
1	2	3	4
Adjustment:			
180°	52	63	70
165°	58	68	76
150°	70	93	118

The experiments conducted upon the effect of the gas upon the formation of carbon monoxide were insufficient to allow any conclusion to be reached with regard to the upper limit of interchangeability of gases. The waste gases were sampled by means of an inverted cone fixed above the burner and led through a Dräger carbon monoxide apparatus.

A series of carbon monoxide determinations was made at different injector settings and constant gas pressure. Town gas was used, and it was found that the CO/CO_2 ratio reached 0·02 only at the setting where lighting back was imminent (cone height = 0·17 cm.) but it was almost beyond determination at setting 210° when the cone was 0·5 cm. It ap-

TABLE 8.—*Dimensions of Unaerated Flames (at 40 mm. Pressure)*

Gas.			Gas Rate, B.Th.U. per Min. per Orifice.	Specific Gravity.	Flame Length, Cm.	Length to Luminous Tip, Cm.	Maximum Breadth of Outer Flame, Cm.	Maximum Breadth of Inner Boundary, Cm.
No.	Description.	C.V., B.Th.U. per Cu.Ft.						
1	2	3	4	5	6	7	8	9
2	C.G. + B.W.G.	500	7·3	0·44	6·1	4·7	—	0·4
6	D.C.G. + B.W.G.	500	7·4	0·42	5·9	3·9	0·6	0·3
13	C.G. + W.G.	500	6·9	0·49	5·2	4·3	—	0·45
14	C.W.G.	500	6·0	0·62	4·9	3·6	0·5	0·3
8	C.G. + P.G.	500	6·9	0·47	5·2	3·4	0·5	0·42
3	C.G. + B.W.G.	450	7·0	0·46	5·9	3·6	0·5	0·32
7	D.C.G. + B.W.G.	450	7·1	0·44	5·3	3·5	0·57	0·38
15	C.W.G.	450	6·1	0·61	5·1	3·0	—	—
9	C.G. + P.G.	450	6·5	0·53	5·8	4·1	0·5	0·32
12	D.C.G. + P.G.	450	6·8	0·49	5·5	3·7	0·6	0·40

NOTE.—The experiments at 500 B.Th.U. were carried out with a jet 0·6 mm. in diameter and those at 450 B.Th.U. with a 0·65 mm. jet.

pears that overloading the burner and simultaneously large cones are not inconsistent with subsequent complete oxidation if the radiant remains hot and combustion can become complete on the outer walls of the radiant. This view was confirmed by altering the gas pressure at setting 150°, for it was again found that at low gas rates the CO/CO_2 ratio climbed to 0·4 at 20 mm. pressure and at 100 mm. it was 0·15. Experiments conducted at setting 195° showed small CO production even at 55 mm. (0·04), although the flame cones were large.

Experiments on Unaerated Burners

Research on unaerated flames has been limited. W. Payman found that flame heights were proportional to calorific value provided that certain limits of hydrogen were not exceeded. S. P. Burke and T. E. W. Schumann have developed a theory for the mechanism of the formation of "diffusion" flames which agrees well with experimental evidence from burners of about ½ in. diameter.

K. Bunte and Lang have measured the lengths, surfaces and volumes of the flames of hydrogen, carbon monoxide and methane and their mixtures. The factors which affect ignition velocity in the aerated flame doubtless operate in the case of unaerated flames, but they are superimposed by the factors which influence the diffusion of the air into the zone of reaction. This is facilitated by the presence of gases of high diffusibility, and hydrogen from the initial gas or formed as a product of thermal decompositions in the flame is considered to play an important part in determining the shortness of the flame.

E. Schaak found in a series of gases the height of an unaerated flame to be a linear proportion of the Prüfbrenner Number. The series of gases investigated were made by adding hydrogen to town gas or coke oven gas to produce low test burner numbers and adding CH_4 to make high values. Consequently there were marked changes in hydrogen content, specific gravity, calorific value, and air requirements such as are not met in gases of the same calorific value but different test burner numbers, and the flame under such circumstances could be expected to vary in height with test burner value. Even then, Schaack found an average rate of increase of 1 per cent. per test burner unit, whereas in an aerated burner the cone increased by 14 per cent. in an old cooker burner and 8 per cent. in a modern cooker per test burner unit.

In view of the widespread usage of unaerated burners in water heaters it was decided to investigate briefly the differences that could be expected in the flames of the series of gases when burnt in unaerated burners. For this purpose the burners fitted to a water heater were selected. These burners consisted of parallel rows of distributing tubes perforated at 1 cm. intervals with holes of a diameter depending on the calorific value of the gas employed (0·65 mm. for 450 B.Th.U. gas and 0·6 mm. for 500 B.Th.U. gas).

To economize in gas consumption during these tests a representative section with 25 holes was cut out of the complete burner and the burner arranged in a darkened box. Gas was supplied at a constant pressure of 40 mm. and the height and breadth of the flame were determined by means of a cathetometer fitted with an eyepiece scale.

Noticeable features of the flames were that the breadth of the flames at the base was very much greater than the diameter of the hole through which the gas emerged, an inner boundary to the flame was well defined and this in its upper portion was capped with a luminous tip, and the ill-defined outer envelope persisted higher than the luminous tip. For a given gas the heights of the main features of the flame, tip of outer envelope, luminous apex and the lower boundary of the luminous zone were found to be proportional to the gas rate. The main dimensions of the flames of various gases, all burnt at 40 mm. pressure, are recorded in Table 8.

No connexion has been traced between these dimensions and the other properties of the gases such as ignition velocity or theoretical air requirements. This is also true of the town gases when burnt in a luminous burner and the flame height measured.

The variation in flame size in changing from one gas to another is very much smaller than the variations that would occur in aerated burners. The unaerated flame has, therefore, advantages in circumstances where a variation in combustion quality of the gas can be expected. They remain sensitive, however, to variations in specific gravity, the rate of heat supply being inversely proportional to the square root of the specific gravity, and this may cause appliances such as water heaters to provide only tepid water when gas of high specific gravity is supplied. Furthermore, with increasing gas rate following a decrease in specific gravity, an increased supply of air for combustion is required, and appliance limitations may cause the combustion to be incomplete.

Gas Undertakings' Results

Associated Gas and Water.

In their report to the shareholders, the Directors of Associated Gas and Water Undertakings, Ltd., state that during the year ended March 31 last a majority interest has been acquired in the Bideford Gas and Coke Company, Ltd., the Bridgwater Gas Light Company, the Godalming Gas and Coke Company, Ltd., the Taunton and District Gas Company, and the Wellington (Somerset) Gas Company. A detailed list accompanying the report shows that this increases the number of gas and electricity undertakings subsidiary to Associated Gas and Water Undertakings to twenty-two. The net revenue for the twelve months covered by the accounts amounts to £75,150, to which has to be added the balance brought forward of £17,564. After payment of a dividend for the year of 5% on the ordinary shares (the same as for the preceding twelve months), the sum of £22,760 will remain to be carried forward.

Montevideo.

The Directors of the Montevideo Gas and Dry Dock Company, Ltd., in their report for the year 1938, state that sales of gas show an increase of 3·72% over those of the preceding twelve months, and the number of consumers an increase of 6·07%. The balance of the Net Revenue Account, after providing for various charges, and for an interim dividend of 1½%, free of income-tax, on the ordinary capital, amounts (with £74,213 brought forward) to £78,229. From this, the Directors recommend the payment of a final dividend of 2½%, free of income-tax (making with the interim dividend 4%, free of income-tax, for the year). This will leave to be carried forward the sum of £61,354.

Peterborough.

An increase in sales of gas of 5¼% over those of the previous year is reported for the twelve months ended March 31 last by the Directors of the Peterborough Gas Company. In actual quantity, the increase in the gas sold was 87,346½ therms, or 17,469,300 cu.ft. A dividend for the year of 7½% on the consolidated ordinary stock leaves a balance of £12,837 at credit of Profit and Loss Account. The authority of the shareholders has been sought to the issue of such an amount of consolidated ordinary stock as will raise £17,025 6s. 11d.—being the balance of stock remaining to be issued under the provisions of the Company's Act of 1906. Arising out of a serious explosion which occurred at the City Hotel, Bridge Street, Peterborough, last November, the Company have been involved in recent litigation. As to this, the Directors say: "The Peterborough Corporation were engaged in laying new water mains in the vicinity of the hotel, during which the Company's gas main was disturbed and ultimately fractured by the Corporation's contractors. Subsequently the proprietor of the hotel and six injured parties sued the Corporation and the Company jointly for damages. On the advice of Counsel that the Company had a technical liability of undefined amount, the Company agreed to accept responsibility equally with the Corporation, and the expenditure for camages agreed up to March 31 last has been £5,145 12s. 1d. Fortunately this sum and subsequent expenditure can be charged to the Special Purposes Fund, created in past years to provide for such contingencies, and this unfortunate expenditure will not, therefore, in any way affect the current finances of the Company."

South Midland Corporation.

For the year ended March 31 last, the South Midland Gas Corporation, Ltd., are paying a dividend on the ordinary shares of 5½%, and carrying forward the sum of £812, which compares with £714 brought in. The profit for the past year amounts to £6,150, after charging income-tax and all other expenses. The appropriations recommended by the Directors include £500 for writing down buildings and plant at the Eynsham Works, and £700 for writing down compensation to Directors of Subsidiary Companies, stamp duties, &c.

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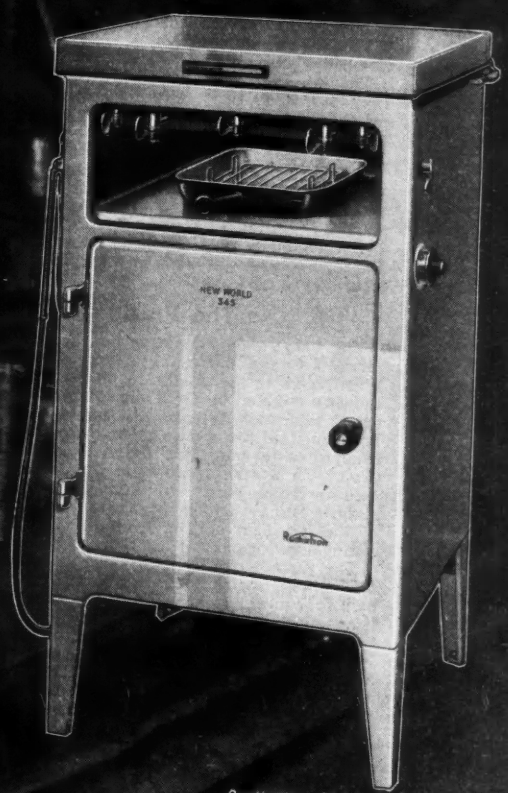

Radiation Ltd.

MEETINGS OF JUNIOR GAS ASSOCIATIONS

Manchester and District

The 8th General Meeting of the session was held at Oldham on Saturday, May 6, 1939, when visits were made to the Higginshaw Gas-Works, and also to the new Showrooms, of the Oldham Corporation Gas Department.

The members assembled at the Greaves Street Works, where great interest was shown in an air raid shelter which had been erected.

Councillor TWEEDALE, Chairman of the Gas Committee, welcomed the members.

Mr. D. BENSON (Bolton) proposed a hearty vote of thanks to the Chairman and members of the Gas Committee for the facilities that had been granted to them, and also for their subsequent hospitality.

Mr. J. A. SPEERS (Preston) seconded the vote.

Councillor W. T. GLOVER reminded the audience that, in addition to being a member of the Oldham Corporation Gas Committee, he was also a member of the Manchester and District Junior Gas Association. It was a pleasure to have Mr. R. H. Garlick present, who was one of the original members, and who attended the first meeting of the Association, which was held under a lamp-post over forty years ago. The Manchester Association was the first Junior Association to be founded, and it was the model upon which all the other Junior Associations were subsequently formed.

Mr. F. GREENHALGH (Borough Gas Engineer) also responded and thanked the members for the kind references which had been made. It was almost seven years since the plant was started at Higginshaw, and there were now more recent installations, but, nevertheless, Higginshaw still remained a typical modern plant. He was pleased to learn that the members had found plenty to interest them. In any reconstruction there were bound to be certain details which gave trouble, and which could be materially improved in the light of experience. He was very pleased to see so many visitors, and in particular Mr. T. Duxbury, his predecessor, and some of the older members of the Juniors.

Mr. F. Cartledge (Oldham) then read a Paper on "Coal and Coke Handling Plant at Higginshaw Gas-Works," which will be dealt with in a forthcoming issue of the "JOURNAL."

London and Southern

The Annual Business Meeting of the London and Southern District Junior Gas Association was held on Tuesday, May 9, at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C. 1—the PRESIDENT, Mr. S. C. Waldock (Gas Light and Coke Company) presiding.

The Minutes having been read by the HON. ASSISTANT SECRETARY (Mr. H. J. Risby, Severn Valley), confirmed, and duly signed, the following were appointed to act as scrutineers for the ballot—Mr. J. E. Cooper (Gas Light and Coke) and Mr. H. C. Sims (South Metropolitan).

The financial statement was then submitted by the HON. TREASURER (Mr. S. J. Gibbons, Gas Light and Coke), who dealt with the various items in the accounts, which showed that the financial position of the Association was extremely satisfactory. The accounts were adopted on the proposition of Mr. R. F. HAYMAN (Gas Light and Coke), seconded by Mr. G. DOUGILL (Gas Light and Coke).

The President's Report.

The PRESIDENT, submitting his report on the past session, first referred to the interesting Papers and visits during the year. With regard to the discussion on Technical Education in the Gas Industry initiated by Dr. Long, when The Institution of Gas Engineers' Education Scheme was criticized by certain members, the President told the meeting that these criticisms and other matters brought to the notice of the Association in this connexion were dealt with by the appropriate Committee at a meeting specially held for the purpose. Continuing, Mr. Waldock recalled that their Annual Dinner held in November was honoured by the presence of the President of The Institution of Gas Engineers and other distinguished leaders of the Industry.

The three Discussion Groups (Manufacture, Distribution, and Utilization), inaugurated this year as an experiment, had each held four meetings, at which much useful technical knowledge had been disseminated in an informal way, and they were indebted to the respective Chairmen (Messrs. Grayston, Richbell, and Noble) for their valuable work, which was much appreciated by all those members who had attended the Group Meetings.

Accompanied by Mr. H. W. H. Butterfield (Senior Vice-President) and Mr. B. W. Dawkins (Hon. Secretary), the President had attended the Annual Meeting of the Joint Council of the British Junior Gas Associations held last September, at which the question of closer co-operation with the work of The Institution of Gas Engineers was discussed. The matter was subsequently referred back to the Junior Associations, and after careful consideration of the terms and conditions offered by the Institution, the Council of the London and Southern District Junior Association decided to support the suggested affiliation of the British Junior Gas Associations with The Institution of Gas Engineers; the subject would again be brought before the Joint Council at their next meeting. Their affiliation with the Southern Association of Gas Engineers and Managers enabled them to keep in touch with the work of that body. During his year of office the Hon. Secretary and he had attended all the meetings to which they had been invited, while the President and Vice-President of the Southern Association had been present at some of the Junior meetings. The Hon. Secretary and he had also had the honour of representing the Association at the combined meeting of members of the Junior Gas Associations held at the Empire Exhibition, Glasgow, in September, when they had the pleasure of seeing the Exhibition and meeting a number of members from the Scottish, Yorkshire, Manchester, and Western Junior Associations.

Examination Successes.

The President went on to refer to the successes gained by members of the Association in the I.G.E. Examinations. Mr. N. Calvert and Mr. J. Malsbury each obtained a First-Class Diploma in Gas Engineering (Manufacture); Mr. Malsbury was also awarded the Charles Hunt Memorial Medal for the highest place. In addition, 14 First-Class Certificates and 17 Seconds were obtained by members of the Association. It would be agreed that this was splendid achievement, and Mr. Waldock had much pleasure in congratulating the members concerned.

During the year under review the membership of the Association had been well maintained above the 500 mark, and now stood at 511; about 60 gas undertakings were represented.

After paying tribute to the tireless efforts of the Officers of the Association, the President took the opportunity of expressing the thanks of the members to the Directors and officials of the various companies and organizations who had provided facilities for their visits, for the hospitality shown to them, as well as for the interesting information freely made available for the benefit of the members; he also thanked the Principal of the Westminster Technical Institute (Dr. J. N. Long) for providing accommodation for many of their meetings, and also the Technical Press for their assistance. In conclusion, he expressed his personal thanks to the Governor, Directors, and Chief Officers of the Gas Light and Coke Company for their support, while to the Council, Officers, and all members of the Association he tendered his thanks for their help in making his year of office a very happy one.

The President's Report was unanimously adopted on the proposition of Mr. F. H. G. HIGTON (East Surrey), seconded by Mr. C. F. PETERSEN (Bournemouth), after which the Chairmen of the three Discussion Groups commented briefly on the activities of their Groups at the same time appealing for greater support from the members.

A cordial vote of thanks to the Officers and Council for their work during the session was accorded on the resolution of Mr. G. GARDINER (Wandsworth), supported by Mr. A. R. COWLISHAW (South Metropolitan), which was duly acknowledged by the PRESIDENT.

It was unanimously agreed that a testimonial be presented to the President as a token of the Association's appreciation of his work on their behalf. This was proposed Mr. H. MOYS (Commercial), seconded by Mr. G. DOUGILL. Mr. WALDOCK thanked the members very sincerely for this resolution.

New Officers and Council.

The Officers and Council for the Session 1939-40 were elected as follows:

President.—F. O. Hawes (Tottenham).
Senior Vice-President.—G. Dougill (Gas Light and Coke).
Junior Vice-President.—H. Moys (Commercial).
Hon. Secretary.—B. W. Dawkins (Gas Light and Coke).
Hon. Treasurer.—S. J. Gibbons (Gas Light and Coke).
Assistant Hon. Secretary.—H. J. Risby (Severn Valley).
Hon. Auditor.—G. Wilson Smith (Gas Light and Coke).
Council.—C. A. Deas (Tottenham), J. Grayston (Romford), F. H. Higton (East Surrey), H. G. Kenyon (Lea Bridge), R. W. Latham (Croydon), T. G. Noble (Gas Light and Coke), H. J. Risby (Severn Valley), and H. G. Rogers (Gas Light and Coke).

The scrutineers were thanked for their services on the proposition of Mr. H. G. ROGERS, seconded by Mr. J. E. GRAY (Gas Light and Coke), after which the representatives to serve on the District Education Committee were announced by the PRESIDENT as follows: T. H. Prater (Isle of Thanet), Hon. Secretary; F. O. Hawes

(Tottenham); G. Dougill (Gas Light and Coke); and B. W. Dawkins (Gas Light and Coke). It was agreed that a letter be sent to Dr. J. N. Long (Principal of the Westminster Technical Institute) and his staff, thanking them for the facilities afforded for meetings of the Council and the Discussion Groups.

A vote of thanks to the Technical Press was carried on the proposition of Mr. J. GRAYSTON, seconded by Mr. R. SUMMERSON (Luton), and acknowledged by Mr. F. CLIFTON SHERRIFF, of the "GAS JOURNAL."

A number of suggestions having been made in regard to next session's programme, the meeting closed with a reminder from the PRESIDENT of the Summer Visit to Windsor on June 24.

Midland

The Annual General Meeting of the Midland Junior Gas Association was held at the Gas Offices, Birmingham, on May 11, 1939.

In referring to the Annual Report, the PRESIDENT, Mr. A. W. Attwood (Coventry), congratulated Mr. W. L. Howe, M.Inst.F., upon his being awarded the Milbourne Medal for his Paper, "Gas and the Filtration and Heating of Swimming Pools," read before the Association on April 7, 1938, and also the award of the Silver Medal for the year 1938, offered annually by the Society of British Gas Industries, which was gained by him for the same Paper.

The PRESIDENT then announced that the Council had elected Mr. F. J. Bengough (Birmingham) as Junior Vice-President. Mr. BENGOUGH expressed his thanks to the Council for the honour done to him and said he would do his best to carry on the high traditions of the Association which had been so ably upheld by his predecessors.

A vote of thanks to the retiring Members of the Council, Messrs. H. G. Broadbridge (Andover), Mr. S. C. Bentley (Leicester), Mr. K. L. Pearce (Bilston), Mr. F. J. Bengough (Birmingham), and Mr. F. L. Atkins (*ex officio*), was moved by Mr. E. T. PICKERING (Birmingham), and seconded by Mr. W. N. SMIRLES (Birmingham), Mr. F. L. ATKINS replying on behalf of the retiring Members.

In moving a vote of thanks to the officers, Messrs. A. Hill (Honorary Secretary), F. A. Grant (Assistant Honorary Secretary), G. W. Smith (Honorary Treasurer), and W. P. Timbrell (Honorary Auditor), the PRESIDENT said he had undertaken this pleasant duty himself because, as President, he had intimate knowledge of the excellent work they performed during the session. The vote of thanks was seconded by Mr. F. A. JENKINS (Leamington), and carried with acclamation. All these Officers, with the exception of Mr. F. A. Grant (who, owing to other duties, had been forced to resign his position) had signified their willingness to continue in their Offices, and it was unanimously resolved that they be re-elected *en bloc*.

To fill the vacancies on the Council, a ballot was taken, and Messrs. C. L. Evans (Birmingham), K. L. Pearce (Bilston), S. C. Bentley (Leicester), and G. E. Burden (Redditch) were elected. A vote of thanks to Messrs. H. R. Hems, F. A. Jenkins, W. McNaughton, and W. L. S. Spinks, who represented the Association on the Education Committee, and to Mr. W. J. Pickering for his work as representative of the Joint Junior Gas Associations on the Executive Committee, was carried with acclamation. Mr. W. J. PICKERING suitably responded. The Education representatives were re-elected *en bloc* for the ensuing year.

The PRESIDENT then called upon Mr. G. DIXON, Engineer and Manager of the Nottingham Gas Department and Vice-President of The Institution of Gas Engineers, to deliver his Address, which will be dealt with in a subsequent issue.

At the conclusion of the Address, the PRESIDENT said Mr. Dixon had mentioned the opportunities which offered themselves to Juniors to form study groups, particularly on the subject of the lighting problem, and said the Council of the Association would be pleased to form such a group if sufficient support were forthcoming.

Mr. G. C. PEARSON (Birmingham), President of the Midland Association of Gas Engineers and Managers, proposed a vote of thanks to Mr. Dixon. He thought no one in the Gas Industry could afford these days to be merely an individual; there was so much knowledge which should be pooled. Unless a man belonged to some Association, he could not obtain all the information that was being disseminated.

Mr. W. L. S. SPINKS (Birmingham), seconding the vote of thanks, said that if Mr. Dixon had not already confessed to his great interest in the Juniors, his Paper would have indicated this interest, which could not have been put forward by anyone who had not had the welfare of the Juniors at heart over a long period. He had referred to the work of the Technical Sub-Committees of The Institution of Gas Engineers, and his suggestion that the Junior Association should form study groups to concentrate on the work being done by these Sub-Committees, was a very useful one. It was a fresh idea given to the Juniors by a man who was really anxious to increase the usefulness of the Junior Associations.

Mr. DIXON briefly acknowledged the vote of thanks.

Trade News

Orders for Simon-Carves Coking Plants.

Important extensions and improvements are to be carried out to the coking plant at the Margam Works, South Wales, of Guest Keen Baldwins Iron and Steel Company, Ltd. A contract has been placed with Simon-Carves, Ltd., Cheadle Heath, Stockport, for 54 compound "Underjet" coke ovens of the Otto type, built in high silica, capable of carbonizing 1,000 tons of dry coal per day. The ovens will be built in one block, and will replace an existing battery which is to be demolished. They will be 44 ft. 7 in. over sole, 12 ft. 6 in. high, and have a mean width of 17¼ in.

The contract also includes a coal service bunker, coal handling plant, alterations to the existing Simon-Carves coal washery, and a complete coke handling and screening plant for the separation of furnace coke and three sizes of domestic coke.

The existing by-product plant will, to a large extent, be utilized, but will be extended to deal with the greater throughput of the new ovens. A complete new sulphate of ammonia plant of the semi-direct type will be added. Simon-Carves' contract also comprises all foundations and excavations, and the whole of the electrical equipment.

A contract has also been placed with Simon-Carves by Wm. Baird & Co., Ltd., of Twechar, near Glasgow, for a complete new plant for the manufacture of foundry coke and a special low ash coke for use as electrodes in the aluminium industry. Thirty Simon-Carves rich gas "Underjet" coke ovens of the Otto type are to be built, divided into two batteries, one of 23 ovens for foundry coke and the other of 7 ovens for the electrode coke. A compressed charge will be used, and the contract includes compressing machinery of the latest type, together with a stamping station taking coal from the existing line of bunkers.

Quenching will be effected at a sloping bench for the foundry coke, and at a flat bench for the electrode coke which will be specially hand picked before loading. A coke screening plant will be provided for dealing with the foundry coke and the smalls from the electrode coke. The secondary screening plant will separate into four sizes which will be loaded direct into railway wagons.

A by-product plant of the indirect type will be included on a new site; the existing benzole stripping and ammonia sulphate plants will be utilized in the new scheme. All foundations and the whole of the electrical equipment are included in Simon-Carves' contract.

Five-Day Week Experiment.

Manesty Machines, Ltd., Speke Hall Road, Liverpool, 17, manufacturers of Tablet compressing machines and automatic water stills, have been operating a five-day week for almost two years. This experiment has proved highly satisfactory, but owing to extreme pressure of work, the firm has been forced to discontinue the five-day week, and will now open on Saturdays. Valuable information has been obtained during the period the five-day week has been in operation.

Head, Wrightson Stampings, Ltd.

Plans submitted by Head, Wrightson Stampings, Ltd. (registered offices, Thornaby-on-Tees), for their new factory at Seaton, nr. West Hartlepool, were passed at a recent meeting of the Stockton Rural Council. The site layout provides for works buildings 250 ft. in length and 66½ ft. wide, superficial floor area of the factory being 16,500 sq.ft. Plans were also approved for offices, power, and meter houses, workmen's welfare facilities, &c., with floor area of 4,220 sq.ft.

The Company, which is to specialize in the production of aircraft and automobile components, will, it is expected, commence production in August.

Automatic Furnace Regulators.

The regulators described in an artistic folder, a copy of which we have received from the Cambridge Instrument Company, Ltd., 13, Grosvenor Place, London, S.W. 1, are of the electrical type and suitable for almost any industrial application. These regulators are widely employed to control gas-fired furnaces. They are claimed to represent the highest grade of accuracy available and can be relied upon to give continuous and reliable service. For many years the Cambridge Instrument Company has specialized in regulation problems and their organization is at the service of all for advice on suitable equipment. All Cambridge regulators are fully guaranteed for material and workmanship.

"Calor Gas" for the Holiday Maker.

For the convenience of the many thousands of people who require mobile cooking, lighting, and heating, a "Calor Gas List of Stockists" has been prepared, giving full addresses, telephone numbers, and early closing days of the stockists throughout the British Isles.

The Menace of Chimney-less Flats and Houses

IMPROVEMENTS IN THE HEATING COMFORT AND HEALTH OF THE BRITISH PEOPLE

Mr. George Helps proposes to show privately some entirely new coal and gas fires in London within the next few weeks. The simple methods of heat production now possible by the use of coal or gas alone, and also by gas in combination with coal, coke, or other solid fuel, represent the work of a life-time. Coal may be used in these fires with very little smoke production. Fires may be fed automatically with solid fuel. The economies in use are such that the cost of gas in combination with coal is less than the cost of coal used alone in the ordinary grate. Such fires allow of the complete destruction of domestic refuse.

The dates and place of such demonstrations will be published in due course, and these will be private and admission obtained by invitation only.

This notice is given so that Gas Authorities and others who may be making contracts for the supply of gas fires and other appliances for the coming season, may know that new fires—offering immense advantages over the best fires hitherto provided for the market—are available. There are other reasons: it is believed that these appliances will be found to open up an entirely new application of gas for many purposes besides fires and domestic appliances.

In addition to "Bi-Fuel" fires, a new all gas fire will be shown in operation, which is so unlike any other gas fire yet produced that only the gas remains of the fires hitherto marketed. This fire is so silent in operation and the gas flames so hidden that the source of heat is not apparent. In fact, it is a revelation of what gas can do when properly applied.

The Nuneaton Gas Company is producing all these fires and other appliances and placing them on the market until other arrangements are made for their production and sale. Applications are invited from those who wish to view the demonstrations—particularly those who are interested in obtaining simple and good appliances within a few days of their order, and at attractive prices.

Notice is also drawn to the fact that the fires, etc. concerned are the subject of the following patents—407,923; 429,923; 431,676; 426,898; 465,290; 489,621; 489,627. Other patents pending.

IN REGARD TO CHIMNEY-LESS FLATS AND HOUSES

It is common knowledge that the air we breathe is as important to health as the food we eat.

Some of the greatest Medical authorities in the Country have told us definitely that for health there is nothing like FRESH AIR, and that **a bright fire and a hot chimney are definitely necessary to provide it in the home.**

A bright fire is always cheery, and a hot chimney acts as a heat engine or locomotive and draws in fresh and pure air often from around the green trees, the flowers in the fields and the hedgerows—for the benefit of our being.

Stagnant heat like that produced from various so-called heating appliances that are little more than warm to the touch, produces almost as foul an atmosphere as that of a number of people in a closed, or unventilated, room.

There is also the problem of refuse. Poisonous flies and all sorts of insects are attracted by certain refuse which ought to be destroyed, preferably burnt, as soon as it has accumulated. A chimney-less house does not allow of this, and is therefore a menace to health to a greater degree than is generally realized.

The man in the street—tinker, tailor, soldier, sailor, and the rest who make up 80/90 per cent. of the community—finds it very difficult indeed to provide at a moment's notice a cheery fire to warm and dry himself, and which helps to create a pure and sweet smelling atmosphere. Countless people therefore suffer from colds and other ailments due to the consequences of that lack of warmth and ventilation at the right time.

It is largely up to the Coal and Gas Industries to prevent the building of obviously unhealthy dwellings for both poor and rich alike.

GAS WORKS, NUNEATON.

22*nd May*, 1939.

Markets and Manufactures

Current Sales of Gas Products

The London Market

May 22.

There are no alterations to record in the values of Tar Products in the London markets, present prices being as follows:

Pitch, nominal, at about 26s. per ton f.o.b.
Creosote, about 3½d. to 3¾d.
Refined tar, 3¾d.
Pure toluole, about 2s. 5d. to 2s. 6d.
Pure benzole, about 1s. 9d.
95/160 solvent naphtha, 1s. 7d. to 1s. 8d.
90/160 pyridine, about 11s.
All per gallon naked at makers' works.

The Provinces

May 22.

Crude Gas-Works Tar, 12s. to 17s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 27s. to 28s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 27s. to 28s.* Toluole, naked, North, 1s. 10d. to 1s. 11d. Coal tar, crude naphtha, in bulk, North 7¼d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 2½d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 3¾d. to 4¼d.; low gravity, 4d. to 4½d. Carbolic acid, 60's, 1s. 7d. to 1s. 10d. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsaleable. Heavy oil: Unfiltered anthracene oil, min. gr. 1,080, 4¾d. to 4⅞d.; filtered anthracene oil, min. gr. 1,080, 5¼d. to 5¾d.; heavy tar oil, gr. less than 1.080, 4½d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls, whatever they may be.

Scotland

GLASGOW, *May* 20.

In the home market inquiries are fairly numerous, but, on the whole, prices continue weak.

Crude gas-works tar.—The actual value is about 30s. to 31s. per ton *ex* works in bulk.

Pitch of vertical quality can be readily secured at 20s. to 21s. per ton f.o.b. for export and round 20s. per ton *ex* works in bulk for home trade.

Refined tar.—For home use prices are maintained at 3¾d. to 4d. per gallon, while for export supplies are offered at about 2¾d. to 3d. per gallon, both into buyers' packages at makers' works.

Creosote oil.—No change can be reported in the position which is quietly steady. The following prices are for reasonable quantities: Specification oil, 3¼d. to 3¾d. per gallon; low gravity, 4¼d. to 4½d. per gallon; neutral oil, 3¾d. to 4d. per gallon; all *ex* works in bulk.

Cresylic acid remains a dull feature, with quotations as under: Pale, 97/99%, 1s. 2d. to 1s. 3d. per gallon; dark, 97/99%, 1s. to 1s. 1d. per gallon; pale, 99/100%, 1s. 4d. to 1s. 7d. per gallon; all *ex* works in buyers' packages.

Crude naphtha.—Available supplies command round 5d. to 5½d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is round 1s. 3½d. to 1s. 4¼d. per gallon and 90/190 heavy naphtha is about 1s. 1d. to 1s. 2d. per gallon.

Motor benzole remains at 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—90/160 grade is 8s. 6d. to 9s. 6d. per gallon, and 90/140 grade is 9s. 6d. to 10s. 6d. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole..	0	9½	to	0	10	per gall. at works
Motor ,, ..	1	3	,,	1	3½	,, ,, ,,
90% ,, ..	1	4	,,	1	4½	,, ,, ,,
Pure ,, ..	1	8	,,	1	8½	,, ,, ,,

Contracts Advertised To-Day

Coal.
Atherton Gas Department. [p. 554.]
Nelson Gas Department. [p. 553.]
St. Ives (Cornwall) Gas Department. [p. 554.]
Wallasey Gas Department. [p. 553.]

Condensers.
Leeds Gas Department. [p. 554.]

District Governors.
Warrington Gas Department. [p. 553.]

Exhausters.
Leeds Gas Department. [p. 554.]

Mainlaying.
Sutton-in-Ashfield Gas Department. [p. 553.]

Paint.
Burton-upon-Trent Gas Department. [p. 554.]

Purifiers.
Sutton-in-Ashfield Gas Department. [p. 553.]

Station Meters (Connersville).
Leeds Gas Department. [p. 554.]

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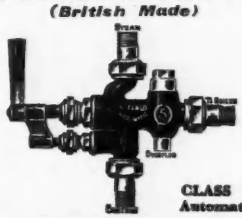
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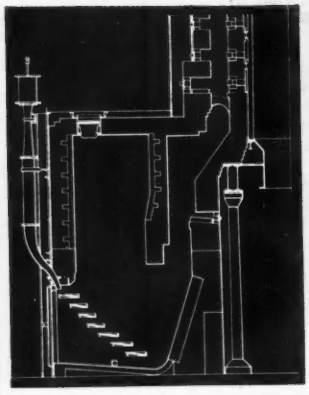

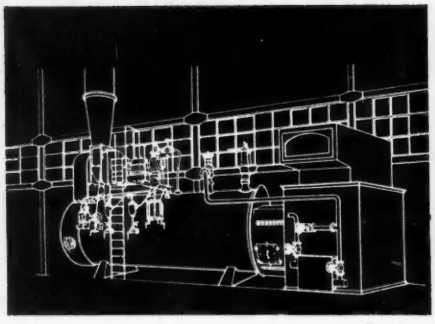

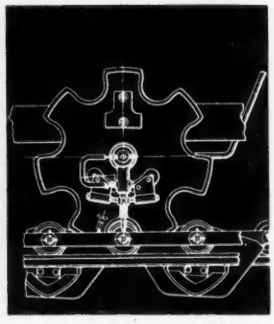

FOR THE RETORT HOUSE

Fuel-gas generation in pressure-operated producers; steam-raising by waste-heat recovery; and automatic force-feed lubrication applied to coal and coke conveyors are amongst the standard features of the modern Glover-West vertical retort installation.

WEST'S

CARBONIZING PLANTS

***Blackpool's new carbonizing plant will be* GLOVER-WEST VERTICALS**

WORK is proceeding on a 72-retort installation of Glover-West vertical retorts at the new Marton gas works for the Blackpool Corporation Gas Department. The plant will be equipped with pressure type producers, waste-heat boilers, dust extraction and air-conditioning plants, together with extensive coaling equipment and coke handling, cutting, grading and de-dusting units. The drawing shows the architectural design of the retort house and coke plant.

WEST'S
GAS IMPROVEMENT CO · LTD
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Glover-West Vertical Retorts Westvertical Carbonizing Chambers

435 INSTALLATIONS BUILT OR ORDERED IN 24 COUNTRIES

GAS STOCKS AND SHARES

For the time being at any rate, in spite of the international situation, more confidence is returning to stock markets. Last week saw a further expansion in business, though this has not yet reached anything like normal proportions. The two outstanding features were the strength of British Funds and home railways. Most noticeable among the former was the rise in India stocks. The report of the Transport Advisory Council to the Ministry of Transport appears to tally with the Railways' conception of a "Square Deal," and although much has yet to be done before the recommendations can be put into practice, both the report and the latest goods traffic returns gave a further stimulus to the values of home rail stock. Leading industrialists were also in demand and made a good showing.

Gas stocks and shares were better supported, and, in the absence of any further international complications which would affect values generally, it really looks as if prices are about to turn the corner. It will be seen in the List below that both South Metropolitan and South Suburban "ordinaries" strengthened, and Imperial Continental was again marked up, while on the provincial Exchanges Newcastle units recovered half their previous week's loss of 1s.

At the time of writing there is a good supply of ordinary stock available. The yields obtainable at current prices are attractive for the security offered and indicate that some appreciation in values is justified. The following list shows a few of the parcels available:

Ordinary Stocks.

Amount on Offer.	——	Dividend.	Price.	Gross Yield, %.
£		%		£ s. d.
500	Associated Gas and Water £1	5	17/6	5 14 3
250	Bombay £1	8	20/6	7 16 0
1,000	British	7½	112	6 14 0
1,000	Commercial	4½	58	7 15 0
517	Croydon sliding scale	7	128	5 9 3
1,150	Eastbourne "A"	7½	131	6 0 3
5,000	Gas Light £1 units	£5 12s.	22/3	5 0 6
1,000	Imperial Continental	10	118	8 9 6
5,000	Mid-Southern Utility "C"	5*	100 free	5 0 0
2,500	South Metropolitan	5½	94	5 16 9
1,000	South-Western Gas and Water £1	5	17/–	5 18 6
600	Tottenham	6½	115	5 17 3
2,000	United Kingdom £1	5	17/6	5 14 3

* Dividend from May 19 to June 30 payable September.

The accounts of Associated Gas and Water Undertakings, Ltd., for the year to March last show a profit of £75,150 compared with £59,419 for 1937/38. It is proposed to pay a final dividend of 2½%, again making 5% for the year, and to carry forward £22,760, against £17,564.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 19.	Rise or Fall on Week.
1,767,439	Mar. 6	8	8	Alliance & Dublin Ord. ...	130—140	...
374,000	Dec. 19	4	4	Do. 4 p.c. Deb. ...	90—95	...
877,576	May 8	5	5	Asscd. Gas & Water U'd'ts Ord.	16/6—18/6*	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6*	...
535,545	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	18/6—20/6*	...
318,730	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/—18/–*	...
750,000	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—97	...
560,070	Feb. 20	7	7	Barnet Ord. 7 p.c.	153—158	...
300,000	Apl. 6	1/4⅜	1/9⅜	Bombay, Ltd.	18/—20/–	+–/6
181,185	Feb. 20	9½	9½	Bournemouth sliding scale ...	192—202	...
690,526	,,	7	7	Do. 7 p.c. max. ...	153—158	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	127—132	...
50,000	Dec. 19	3	3	Do. 3 p.c. Deb. ...	70—75	...
362,025	,,	4	4	Do. 4 p.c. Deb. ...	95—100	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	110—115	...
357,900	Feb. 20	7½	7½	Brighton, &c., 6 p.c. Con. ...	135—140	...
659,955	,,	6⅔	6⅔	Do. 5 p.c. Con. ...	118—123	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	110—120	...
855,000	Mar. 20	7	8	British Ord.	110—120	...
100,000	Dec. 19	7	7	Do. 7 p.c. Pref.	138—143	...
350,000	,,	5⅓	5⅓	Do. 5⅓ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	93—98	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
100,000	22May'33	6	4	Cape Town, Ltd.	¾—1¾	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1—2	...
150,000	Dec. 19	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	Feb. 6	6	6	Cardiff Con. Ord.	112—117	...
237,860	Dec. 19	5	5	Do. 5 p.c. Red. Deb. ...	103—108	...
98,936	Mar. 20	2/–	2/–	Colombo Ord.	1⅞—1⅞	...
24,510	,,	1/4⅜	1/4⅜	Do. 7 p.c. Pref. ...	22/—24/–	...
739,453	Mar. 20	–/11·48	–/11·48	Colonial Gas Assn. Ltd. Ord.	16/—18/–	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	23/—25/–	...
1,775,005	Jan. 23	5	4	Commercial Ord.	50—60	...
140,000	Feb. 6	§13/4	4	Do. 4 p.c. Red. Pref. ...	95—100	...
620,000	Dec. 5	3	3	Do. 3 p.c. Deb. ...	60—65	...
286,344	Feb. 20	5	5	Do. 5 p.c. Deb. ...	103—108	...
200,000	,,	5⅜	4	Do. 3⅜ p.c. Red. Deb. ...	95—100	...
807,560	Feb. 20	7	7	Croydon sliding scale ...	123—128	...
644,590	,,	5	5	Do. max. div.	94—99	...
620,385	Dec. 19	5	5	Do. 5 p.c. Deb. ...	108—113	...
239,000	Feb. 6	5	5	East Hull Ord. 5 p.c. ...	88—93	...
187,215	Feb. 6	6	6	East Surrey Ord. 5 p.c. ...	105—110	...
176,211	Dec. 5	5	5	Do. 5 p.c. Deb. ...	107—112	...
250,000	Nov. 7	8	4	Gas Consolidation Ord. 'B' ...	19/—21/–	...
250,000	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6	...
19,189,963	Feb. 6	5⅜	5⅜	Gas Light & Coke Ord. ...	21/3—22/3σ	...
2,600,000	,,	3⅜	3⅜	Do. 3⅜ p.c. max. ...	65—70	–2
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	90—95	+3
2,993,000	Jan. 9	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	92—97	...
8,602,497	Nov. 21	3	3	Do. 3 p.c. Con. Deb. ...	71—76	+1
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	105—110	...
3,500,000	,,	4⅛	4⅛	Do. 4⅛ p.c. Red. Deb. ...	102—107	...
700,000	Mar. 6	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	90—95	...
270,466	Feb. 20	6	6	Harrogate New Cons. ...	105—115	...
157,500	Mar. 20	‡1/–	‡1/–	Hong Kong and China Ord. ...	⅛—⅜	...
213,200	Feb. 6	5⅜	6	Hornsey Con. 3½ p.c. ...	97—102	...
5,600,000	May 8	8	12	Imperial Continental Cap. ...	113—118*	+2
172,810	Jan. 23	3½	3½	Do. 3½ p.c. Red. Deb. ...	87—92	...
235,242	Mar. 6	8½	8½	Lea Bridge 5 p.c. Ord. ...	145—155	...
63,480	Dec. 19	3	3	Maidstone 3 p.c. Deb. ...	58—63	...
45,000	Nov. 21	†10	†10	Malta & Mediterranean ...	130—135	...
				Metropolitan (of Melbourne)		
392,000	Apl. 6	5½	5½	5½ p.c. Red. Deb.	98—103	...
231,977	Feb. 20	5	5	M.S. Utility 'C' Cons. ...	95—100	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref. ...	83—88	...
390,076	Dec. 19	4	4	M.S. Utility 4 p.c. Deb. ...	90—95	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	107—112	...
125,000	Jan. 3	3½	3½	Do. 3½ p.c. Red. Bds.	94—97	...
675,000	May 8	†6	†3	Montevideo, Ltd.	63—68*	...
250,000	Mar. 6	7½	7½	North Middlesex 6 p.c. Con.	135—140	...
396,160	Feb. 6	5	5	Northampton 5 p.c. max. ...	103—108	...
300,000	April 24	†9	†7	Oriental, Ltd.	135—145	...
468,537	Dec. 5	8	7⅔	Plymouth & Stonehouse 5 p.c.	108—118	...
621,667	Feb. 20	8½	8½	Portsmouth & Gosport Cons.	135—145	...
241,446	,,	5	5	Do. 5 p.c. max. ...	98—103	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	102—107	...
75,000	,,	4	4	Do. 4 p.c. Pref. ...	82—87	...
114,000	Feb. 6	5	5	Preston 5 p.c. Pref.	102—107	...
247,966	Dec. 19	4	4	Primitiva 4 p.c. Cons. Deb. ...	96—101	...
625,959	Jan. 9	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
15,000	Mar. 6	6	6	San Paulo 6 p.c. Cum. Pref. ...	8—9	...
441,275	May 8	1/1⅛	1/1⅛	Severn Val. Gas Cor. Ld. Ord.	20/—22/–*	...
460,810	Mar. 20	–/10⅞	–/10⅞	,, ,, 4½ p.c. Cum. Pref.	19/—21/–	...
133,201	Mar. 6	8½	5	Shrewsbury 5 p.c. Ord. ...	141—146	...
9,000	June 3	4	4	South African Ord.	4½—5½	...
1,371,752	April 24	1/2⅝	1/2⅝	South East'n Gas Cn. Ld. Ord.	20/6—22/6	...
871 636	Mar. 6	–/10⅞	–/10⅞	Do. 4½ p.c. Red. Cum. Pref.	19/—21/–	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	17/—19/–	...
450,000	Feb. 6	4	4	Do. 4 p.c. Deb.	95—100	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
6,709,895	Feb. 6	5	6	South Met. Ord.	90—93	+2
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	118—123	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	85—90	...
1,895,445	Dec. 19	3	3	Do. 3 p.c. Deb.	67—72	...
1,000,000	Jan. 9	5	5	Do. 5 p.c. Red. Deb. ...	104—108	...
600,000	,,	§31/–	3⅛	Do. 3⅛ p.c. Red. Deb. ...	93—98	...
1,543,795	Jan. 23	6	6	South Suburban Ord. 5 p.c. ...	105—110	+2½
512,825	,,	5	5	Do. 5 p.c. Pref.	103—108	...
500,000	,,	4	4	Do. 4 p.c. Pref.	83—88	...
250,000	,,	3⅛	3⅛	Do. 3⅛ p.c. Red. Pref. ...	90—95	...
888,587	Dec. 5	5	5	Do. 5 p.c. Deb.	107—112	...
250,000	,,	4	4	Do. 4 p.c. Deb.	90—95	...
200,000	Feb. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
427,859	Apl. 6	9⅛	1/2⅝	S. Western Gas & Water Ord.	15/6—17/6	...
160,523	Apl. 6	–/10⅞	–/10⅞	Do. 4½ p.c. Red. Cum. Pf.	18/6—20/6	...
110,000	Dec. 19	4	4	Do. 4 p.c. Red. Deb. ...	93—98	...
750,541	Feb. 6	5	5⅓	Southampton Ord. 5 p.c. ...	104—109	...
148,836	Dec. 19	4	4	Do. 4 p.c. Deb. ...	90—95	...
350,000	Feb. 6	5⅓	5⅓	Swansea 5⅓ p.c. Red. Pref. ...	104—109	...
200,000	Dec. 19	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	90—95	...
1,076,490	Feb. 20	6⅔	6⅔	Tottenham and District Ord.	105—115	...
409,835	,,	5⅓	5⅓	Do. 5⅓ p.c. Pref.	110—115	...
62,235	,,	5	5	Do. 5 p.c. Pref.	103—108	...
453,380	Dec. 5	4	4	Do. 4 p.c. Deb.	90—95	...
85,701	Jan. 9	6	6	Tuscan 6 p.c. Red. Deb. ...	95—100	...
1,131,550	May 8	4	6	U. Kingdom Gas Cor. Ord. ...	15/6—17/6*	...
1,051,280	May 8	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	17/—19/–*	...
762,241	,,	4	4	Do. 4 p.c. 1st Red. Cum. Pf.	18/—20/–*	...
745,263	Dec. 19	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pf.	14/—16/–	...
1,066,186	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
378,106	Mar. 6	7	7	Uxbridge, &c., 5 p.c.	120—125	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	102—107	...
1,371,138	Jan. 23	7	7	Wandsworth Consolidated ...	110—115	–½
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	82—87	...
1,343,964	Dec. 19	5	5	Do. 5 p.c. Deb. ...	107—112	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	90—95	...
400,000	,,	§25/–	3⅜	Do. 3⅜ p.c. Red. Deb. ...	93—98	...
558,342	Feb. 6	6⅞	6⅞	Watford and St. Albans Ord.	105—115	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	98—103	...
200,000	,,	5½	5½	Do. 5½ p.c. Pref. ...	110—115	...
200,000	,,	§16/8	4	Do. 4 p.c. Rd. Pf. (1973/8)	93—98	...
100,000	,,	—	—	Do. 4 p.c. Red. Pf. (1959)	97—102	...
200,000	Dec. 19	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
200,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...

σ.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations May 19.	Rise or Fall on Week.
202,152	Mar. 20	5	5	Ascot Ord.	99—104	...
128,182	Dec. 19	5	5	Do. 5 p.c. Pref.	102—107	...
31,035	Mar. 20	-/4⅛	-/4⅛	Associated Utilities 4 p.c. Pref.	15/—17/-	...
100,000	Dec. 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
17,000	Feb. 20	8	8	Bognor Orig. Ord. 'A' ...	142—152	...
62,210	,,	8	8	Do. New Addl. 'A' ...	142—152	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	140—150	...
37,440	Feb. 6	10	10	Cam. Univ. & Town 10 p.c. max.	165—175	...
125,970	,,	7	7	Do. 7 p.c. max.	115—125	...
39,025	,,	5	5	Do. 5 p.c. max.	95—100	...
96,410	Feb. 6	4½	4½	Cardiff 4½ p.c. Pref.	93—98	...
150,000	Feb. 20	4	4	Croydon 4 p.c. Pref.	91—96	...
130 000	Dec. 19	4	4	Do. 4 p.c. Deb.	92—97	...
65,000	Mar. 6	7½	7½	Eastbourne 'A' 5 p.c.	122—132	...
198,000	,,	6	6½	Do. 'B' 3½ p.c.	105—115	...
112,312	,,	5	5	Do. 5 p.c. Pref.	102—107	...
130,000	Dec. 19	5	5	Do. 5 p.c. Deb.	107—112	...
24,000	Feb. 20	8½	8½	Great Yarmouth 8½ p.c. max.	30—35	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	27—32	...
51,160	Dec. 5	5½	5½	Do. 5½ p.c. Deb.	117—122	...
152,600	Feb. 20	8	9	Guildford Cons.	150—160	...
54,055	,,	5	5	Do. 5 p.c. Pref.	102—107	...
68,250	Dec. 19	5	5	Do. 5 p.c. Deb.	105—110	...
156,600	Feb. 20	7	7	Hampton Court Cons. ...	103—113	—7
80,000	Mar. 6	4	4	Lea Bridge 4 p.c. Pref. ...	82—87	...
60,000	,,	6	6	Do. 6 p.c. Pref.	118—123	...
94,876	Dec. 5	4	4	Do. 4 p.c. Deb.	87—92	...
73,620	Mar. 6	8½	8½	Luton Cons. 'A'	150—160	...
107,960	Mar. 20	4	5½	Mid Kent Ord.	8½—9½	...
230,940	Feb. 6	10	10	Oxford & District Ord. ...	165—175	...
47,112	,,	5	5	Do. 5 p.c. Pref.	102—107	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	108—113	...
126,193	May 8	7½	7½	Peterborough Ord.	134—139*	...
64,990	Mar. 6	7½	7½	Redditch Ord.	115—125	...
166,850	Feb. 6	8	8	Romford Ord.	137—142	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—102	...
44,000	Mar. 20	5	5	Do. 5 p.c. Deb.	107—112	...
25,570	Feb. 6	5½	5½	Rugby 5½ p.c. Pref.	118—123	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	103—108	...
42,750	Dec. 5	5½	5½	Do. 5½ p.c. Deb.	115—120	...
110,950	Feb. 20	8	8	Ryde Ord.	137—147	...
270,086	Mar. 20	7	7	Slough Ord.	120—130	...
21,000	Dec. 19	5	5	Do. 5 p.c. Deb.	105—110	...
28,872	May 8	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	16/—18/-*	...
28,866	Mar. 6	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	17/—19/-	...
117,228	Feb. 20	5	7	Swindon Cons.	100—105	...
60,425	Dec. 5	5	5	Do. 5 p.c. Deb.	105—110	...
64,380	Dec. 19	5	5	Torquay & Paignton 5 p.c. Pref.	102—107	...
130,000	Feb. 6	5	8	Wakefield Ord.	116—121	...
81,650	,,	5	5	Do. 5 p.c. max.	92—97	...
82,000	Jan. 23	6	6	Weymouth Ord.	101—106	...
98,384	Feb. 6	6	6	Wolverhampton 6 p.c. Pref.	115—120	...
160,000	Dec. 19	5½	5½	Do. 5½ p.c. Rd. Db.	103—108	...
90,000	Dec. 19	5	5	York 5 p.c. Red. Deb. ...	102—107	...
133,640	Feb. 20	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	115—120	...
120,000	,,	5	5	Do. 5 p.c. Pref.	102—107	...
35,000	Dec. 5	5½	5½	Do. 5½ p.c. Deb.	112—117	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 19.	Rise or Fall on Week.
347,756	Feb. 6	5	6	Bath Cons.	115—117	...
1,667,250	Feb. 6	5	5	Bristol, 5 p.c. max.	105—108	...
120,420	Dec. 19	4	4	Do. 1st 4 p.c. Deb. ...	98—101	...
415,250	,,	4	4	Do. 2nd 4 p.c. Deb. ...	98—101	...
328,790	,,	5	5	Do. 5 p.c. Deb.	115—118	...
274,000	Feb. 20	5	5	Newport (Mon.) 5 p.c. max. ...	95—97	...
13,200	Mar. 20	7	8⅛	Pontyp'l Gas & W. 10 p.c. 'A'	12⅛—13⅛	...
13,600	,,	6	5	Do. 7 p.c. 'B' ...	11½—12	...
40,000	,,	6	5	Do. 7 p.c. 'C' ...	11½—12	...
140,778	Feb. 6	5	5	Weston-super-Mare Cons. ...	103½—105½	...
64,338	Dec. 19	4	4	Do. 4 p.c. Deb. ...	98—101	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb. ...	149—152	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 19.	Rise or Fall on Week.
157,150	Feb. 6	5	6½	Chester 5 p.c. Ord.	107—110	...
92,500	Dec. 19	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Feb. 20	6	6	Liverpool 5 p.c. Ord.	117—119	...
245,500	Dec. 19	5	5	Do. 5 p.c. Red. Pref. ...	100—105	...
306,083	Jan. 23	4	4	Do. 4 p.c. Deb.	99—101	...
106,280	Feb. 6	10	10	Preston 'A' 10 p.c.	177—187	...
188,219	,,	7	7	Do. 'B' 7 p.c.	129—139	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 19.	Rise or Fall on Week.
122,577	Feb. 20	8	8	Blyth 5 p.c. Ord.	157½—158½	...
732,000	Feb. 20	3	3	Hartlepool G. & W. Co. & New	70—71	+½
2,061,315	Feb. 6	5	5½	Newcastle & Gateshead Con.	20/3-20/9a	+-/6
682,856	,,	4	4	Do. 4 p.c. Pref. ...	87—89	—2
776,706	Dec. 19	3½	3½	Do. 3½ p.c. Deb. ...	87—89	—½
277,285	April 24	5	5	Do. 5 p.c. Deb. '43 ...	101—103	...
332,351	Feb. 6	6	6	Sunderland 6 p.c. max. ...	132½—134½	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 19.	Rise or Fall on Week.
542,270	Feb. 6	6	9	Derby Con.	132—137	...
55,000	Dec. 19	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	Dec. 19	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	103—108	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 19.	Rise or Fall on Week.
10,000	Feb. 6	10	10	Great Grimsby 'A' Ord. ...	180—190	...
6,500	,,	10	10	Do. 'B' Ord. ...	180—190	...
79,000	,,	10	10	Do. 'C' Ord. ...	175—185	...
1,806,339	Feb. 20	6½	6½	Sheffield Cons.	137—140	...
95,000	Dec. 19	4	4	Do. 4 p.c. Deb.	100—102	...

a The quotation is per £1 of Stock.
* Ex div.

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